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VisiCalc APPLICATIONS

If you use VisiCalc or are thinking of using it, you should own this book.

	A	B	C	D	E	F	G
1	MAX NUMBER OF SHOP HOURS IN A WEEK =				200		
2							
3	MONTH	12		MONDAYS DATE		23	
4							
5			PATTERN	CUT	ASSEM-	SHIP	EST.
6	JOB NO	CUSTOMER	MAKING	GLASS	BLE		®
7							
8	A300	JOHSON	45	58	25	5	133
9	D325	MCGRAY	15	25	30	[illegible]	70
10	D450	MIS CO.	17	12	15	[illegible]	44
11							
12	TOTALS		77	[illegible]	[illegible]	[illegible]	247
13							
14	MONTH	12		MO[illegible]S [illegible]TE		[illegible]	
15							
16			PATT[illegible]	CUT	[illegible]	[illegible]	[illegible]ST.
17	JOB NO	CUSTOMER	MAKI[illegible]	[illegible]	BLE		HOURS
18							
19	A150	[illegible]	[illegible]	[illegible]	18	1	75
20	A550	[illegible]ST[illegible]	[illegible]	[illegible]	[illegible]7	1	64
21	D[illegible]	[illegible]RTF[illegible]	[illegible]	[illegible]	15	1	47
22							
23	TOT[illegible]		[illegible]	[illegible]	60	3	186
24							
25	MON[illegible]			[illegible]NDAYS DATE		6	
26							
27			PATTERN	CUT	ASSEM-	SHIP	EST.
28	JOB NO.	CUSTO[illegible]	MAKING	GLASS	BLE		HOURS
29							
30	A800	RED FOX	15	20	12	1	48
31	D425	WILLIT	13	15	15	1	44
32	A225	DONIT	1	12	5	1	19
33							
34	TOTALS		29	47	32	3	111
35							
36			PLANT PRODUCTION SUMMARY				
37							
38			PATTERN	CUT	ASSEM-	SHIP	EST.
39	MONTH	WEEK OF	MAKING	GLASS	BLE		HOURS
40							
41	12	23	77	95	70	5	247
42	12	30	55	68	60	3	186
43	1	6	29	47	32	3	111
44							
45	TOTALS		161	210	162	11	544

Part I: Accounts Receivable • Invoicing • Cost Recovery • Production Scheduling • Estimating • Checkbook Ledger • Engineering Formula • Part II: Accounts payable • Payroll report • Monthly sales report • Daily sales report • Daily inventory • Financial forecasting

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USA $12.95

VisiCalc®
APPLICATIONS

by
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Bruce J. Taylor
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MIS
Management Information Source

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First Printing
Cat. No. 62-1051

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The first seven exercises of this book are from the original book The Power of:™ VisiCalc written by Robert E. Williams and Bruce Taylor. The last 5 exercises are from the original book The Power of:™ VisiCalc Volume II written by Robert E. Williams and Brian King.

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PREFACE

The Power Of: VisiCalc is a book of exercises designed especially for users and potential users of the VisiCalc computer program. By performing these simple step-by-step exercises, you will rapidly gain an ability to utilize the broad range of VisiCalc capabilities that make it a most powerful software program available for personal size computers.

Better than an instruction book, The Power Of: VisiCalc demonstrates the use of VisiCalc features through specific application samples.

The Power Of: VisiCalc will show you how to expand your use of VisiCalc, no matter what your application. These twelve easy-to-follow exercises are designed to help you understand and use VisiCalc operations. Business owners, accountants, financial analysts, homeowners, manufacturers, engineers, educators, scientists, architects, students, or anyone with a problem that can be solved using a computer, will find The Power Of: VisiCalc an invaluable companion to their VisiCalc program.

No special training is needed to benefit from the exercises in The Power Of: VisiCalc. All instructions are in plain English. The logic of each step is clearly spelled out, so you can later apply the information to your specific needs. The Power Of: VisiCalc will become your most valuable reference book as you expand your use of VisiCalc.

IF YOU OWN, OR ARE THINKING OF OWNING VisiCalc
YOU SHOULD OWN THIS BOOK

INTRODUCTION

The exercises in this book have been purposely designed to provide an opportunity to easily follow the logic of VisiCalc functions, then have the ability to apply those functions to specific problem-solving situations. Each exercise is self-contained. Each demonstrates some special ability or abilities we have used in solving clients' problems. The discovery of some of these abilities, we feel, is unique to our use, since we have not found anyone else who knows of their existence.

The VisiCalc format is arranged on the computer screen in columns and rows. The VisiCalc format is illustrated in Figure 1. The columns are identified by letter designations, the rows by numbers. Each position where a column and row intersect is a coordinate, or location, like on a street map. The relationships between values in these coordinates are determined by simple instructions entered into the coordinates in the form of algebraic formulas. (Don't get panicky; that just means (a+b) and other similar expressions.) Visualizing the street map image and following the exercises, you will easily and quickly catch on to the power of VisiCalc and how it can work for you.

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

FIGURE 1.

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EXERCISE ONE

ACCOUNTS RECEIVABLE AGEING REPORT

DESCRIPTION

The VisiCalc ability to move specific blocks of data to disk storage has been employed in this example to shift values from one area of the worksheet for reentry in other worksheet areas for referencing and for use in formulas.

To demonstrate VisiCalc's ability, an Accounts Receivable Ageing Report ledger has been set up. To age the accounts listed, an updating operation is performed once a month. Current accounts and those over 30 days old, along with a blank column immediately to their left, are moved to a storage disk, then reentered on the ledger sheet, repositioned one column to the right. The over 60 day and over 90 day values are moved to a storage disk, then reentered in a WORK AREA for an accumulating function.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Making Ledger Entries

Ledger Updating

Making Monthly Entries

Making Additional Entries

Saving

Printing

FUNCTIONS USED

SUM
#

COMMANDS USED

REPEAT LABEL	
FORMAT	R = justifies right
GLOBAL	$ = dollars and cents format
STORAGE	# = saves a Data Interchange Format file
REPLICATE	copies
INSERT	R = row
DELETE	R = row

SETTING UP THE FORMAT

Using the following directions, set up your ledger sheet by copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

```
        A        B        C        D        E        F        G        H        I        J

    1  CUSTOMER            CURRENT  OVER 30  OVER 60  OVER 90   TOTAL             WORK     AREA
    2  NAME                BILLING    DAYS     DAYS     DAYS     DUE            OLD 60   OLD 90
    3  ---------------------------------------------------------------------------------------
    4
    5
    6
    7
    8
    9
   10
   11
   12  ==========================================================
   13
```

Figure 1

To format all locations to display value entries in dollars and cents, type:

/G	starts GLOBAL command
F	FORMAT
$	displays in dollars and cents

To enter your column headings, place your cursor where you wish to make the entry and type:

/F	starts FORMAT command
R	justifies right

Type in your column title. Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column title into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your ledger sheet, place your cursor in the left-most column of the row where you want the line (line A3 in this example). Type:

/-	starts REPEAT LABEL command

-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, leave your cursor where it is and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B3	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
J3	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in Figure 2.

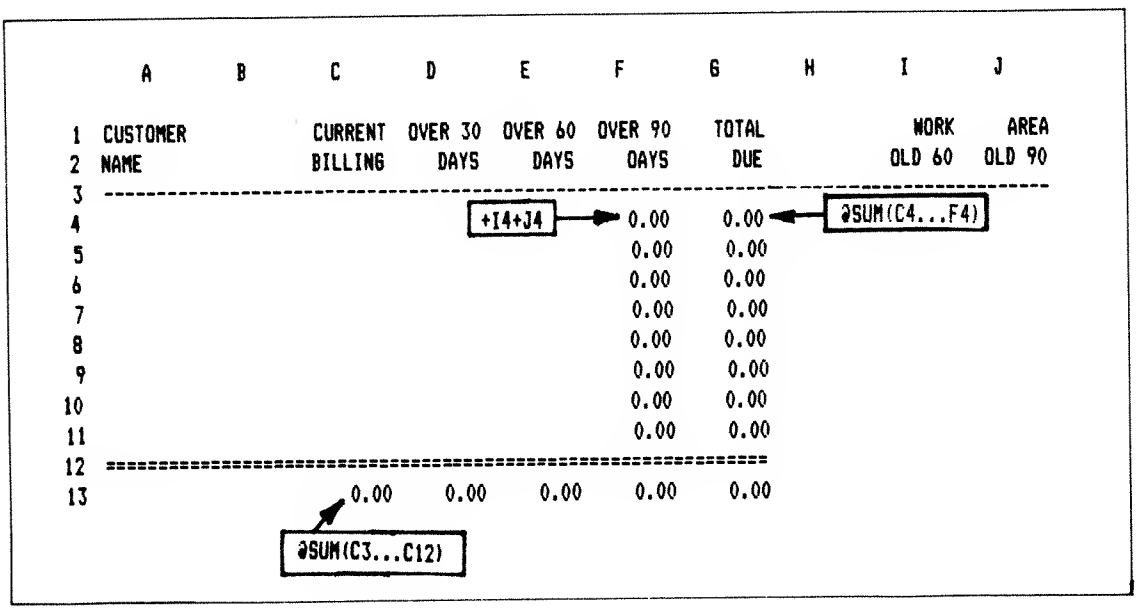

Figure 2

The first formula will add the values in the CURRENT BILLING column.

Place your cursor on C13 and type:

@SUM(	adds values in the list
C3	first coordinate of the column that you wish to add
.	ellipsis ... indicates from-to
C12)	last coordinate of the column that you wish to add
RETURN	enters the formula

Your next operation is to copy the formula just entered at the bottom of each column you wish to add.

Leave your cursor on C13 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in C13
D13	first coordinate where you wish to copy the formula across columns
.	ellipsis ... indicates from-to
G13	last coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

The third formula will add the values in the two WORK AREA columns, and display the answer in the OVER 90 DAYS column. This value will reflect the accumulated value of accounts receivable held more than 90 days.

Place your cursor on F4 and type:

+	prepares coordinate to accept a numeric expression
I4	coordinate containing value
+	adds
J4	coordinate containing value
RETURN	enters the formula

Next, enter a formula in the TOTAL DUE column to add the SUM of the values in each column in the row to the left.

Place your cursor on G4 and type:

@SUM(	adds values in the list
C4	first coordinate of the row that you wish to add
.	ellipsis ... indicating from-to
F4)	last coordinate of the row that you wish to add
RETURN	enters the formula

It will now be necessary to copy the two formulas just entered into each row in their respective columns (OVER 90 DAYS and TOTAL DUE).

Place your cursor on F4 and type:

/R	starts REPLICATE command
G4	copy all entries across columns F4 to G4
RETURN	prepares to receive additional information
F5	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to
F11	last coordinate where you wish to copy the formulas down columns

RETURN	executes the command and prepares to receive additional instructions
R R R R	tells the command to copy the coordinate address in the formula relative to its new location

MAKING LEDGER ENTRIES

Your accounts Receivable Ageing Ledger is now set up. Once a month, all you have to do is perform the update process, described in the next section, and make current billing entries. To perform the following series of exercises, type in the entries illustrated in Figure 3. For this example, entries have been selected to illustrate a ledger in operation more than 90 days.

NOTES

Do not type in the OVER 90 DAYS column. The value to be shown in the OVER 90 DAYS column should be typed in the adjacent row of the OLD 90 column in the WORK AREA. It will be displayed in the OVER 90 DAYS column by the formula entered there.

Never enter values in coordinates containing formulas, or the formulas will be erased.

Column B must remain blank for this example.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3	----------									
4	ACME CO.			45.00		0.00	45.00			
5	BELL CO.				25.00	45.00	70.00			45.00
6	KOLL CO.			56.58		0.00	56.58			
7	MAXEL CO.					89.00	89.00			89.00
8	REDDY CO.				35.00	0.00	35.00			
9	AJAX CO.		75.16			15.00	90.16			15.00
10	ZIPLOK		84.00			0.00	84.00			
11	MULTI-CR		3578.00			0.00	3578.00			
12	==========									
13			3737.16	101.58	60.00	149.00	4047.74			

Figure 3

LEDGER UPDATING

To perform the updating process, you will transfer the values in column B (blank) and the CURRENT BILLING and OVER 30 DAYS columns into a disk storage file. You will then move the values in the OVER 60 DAYS and OVER 90 DAYS columns into a separate disk storage file. In the third step, you will reenter the values in column B (blank) and the CURRENT BILLING and OVER 30 DAYS columns repositioned one column to the right. This moves each of the values to the right, into its new ageing column, and clears the CURRENT BILLING column.

The final step in the updating process reenters the values from the OVER 60 DAYS and OVER 90 DAYS columns into the WORK AREA columns OLD 60 AND old 90. The formula in the over 90 DAYS column adds the sums on each row of these two columns and displays the results in the OVER 90 DAYS column as cumulative totals for each customer listed.

Place your cursor on B4 (the upper-left coordinate of the rectangular ledger sheet area you wish to copy into the stored file).

Type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
SIXTYDAY	name of file; do not type spaces between words
RETURN	prepares to receive additional information
D11	lower-right coordinate of the rectangle of value entries to be saved
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

Place your cursor on E4 (the upper-left coordinate of the rectangular ledger sheet area you wish to copy into the stored file) and type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
NINETYDAY	name of file; do not type spaces between words
RETURN	prepares to receive additional information
F11	lower-right coordinate of the rectangle of value entries to be saved
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

The third step in the updating operation reenters the values from the SIXTYDAY file on the ledger sheet one column to the right.

Place your cursor on C4 (the upper-left coordinate of the rectangular ledger sheet area where you wish the values to be reentered).

Type:

/S	starts STORAGE command
#	loads a (DIF) Data Interchange Format file
L	loads
SIXTYDAY	name of file; do not type spaces between words
RETURN	prepares to receive additional instructions
C	loads the values in column format and executes the command

The final operation enters the values from the NINETYDAY file into the WORK AREA columns.

Place your cursor on I4 (the upper-left coordinate of the rectangular ledger sheet area where you wish the values to be reentered). Type:

/S	starts STORAGE command
#	loads a (DIF) Data Interchange Format file
L	loads
NINETYDAY	name of file; do not type spaces between words
RETURN	prepares to receive additional instructions
C	loads the values in column format and executes the command

You have now completed your monthly update of existing entries. Your ledger should now look like Figure 4. You are ready to enter the transactions that have accumulated during the month just passed.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3										
4	ACME CO.				45.00	0.00	45.00			0.00
5	BELL CO.					70.00	70.00		25.00	45.00
6	KOLL CO.				56.58	0.00	56.58			0.00
7	MAXEL CO.					89.00	89.00			89.00
8	REDDY CO.					35.00	35.00		35.00	0.00
9	AJAX CO.			75.16		15.00	90.16			15.00
10	ZIPLOK			84.00		0.00	84.00			0.00
11	MULTI-CR			3578.00		0.00	3578.00			0.00
12										
13			0.00	3737.16	101.58	209.00	4047.74			

Figure 4

MAKING MONTHLY ENTRIES

Monthly ledger entries will take one of two forms: payments and current billings.

To make current billing entries, type them directly into the CURRENT BILLINGS column.

To make a payment entry into the OVER 30 DAYS or the OVER 60 DAYS columns, place your cursor on the value you wish to deduct from and type:

#	prepares to use value
-	subtracts

Type in payment value:

RETURN	enters the value

To make a payment entry into the OVER 90 DAYS column, place your cursor on the adjacent row in the WORK AREA column containing a value and type:

#	prepares to use value
-	subtracts

Type in payment value:

RETURN	enters the value

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE TWO

INVOICING FROM INVENTORY

DESCRIPTION

This exercise illustrates the ability of VisiCalc to select values from reference tables and to use those values in problem solving. The exercise also illustrates the calculation of a value from predetermined limits on a graduated scale, and changing a value within a set to include application of discount, sales tax, or some other modifying factor.

To demonstrate VisiCalc's ability, an Invoicing from Inventory worksheet is used. Inventory numerical identification, description and quantity are entered on lines in the invoice. The invoice format then automatically calculates the single price for each item and the total for the quantity ordered, adds the invoice total, applies a discount and sales tax factor and displays a grand total. A sales commission is calculated from the invoice net value and displayed in a salesperson commission report.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Making Additional Entries

Saving

Printing

FUNCTIONS USED

LOOKUP
MIN
MAX
SUM

COMMANDS USED

REPEAT LABEL	
GLOBAL	C = column width
GLOBAL	O = order of calculation
FORMAT	R = justifies right
FORMAT	$ = dollars and cents
STORAGE	S = save, and L = load
REPLICATE	copies
INSERT	R = row
PRINT	

SETTING UP THE FORMAT

To set up your beginning format, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

The VisiCalc worksheet format contains columns nine spaces wide when it is first entered into the computer. Column width may be expanded using the following commands. In this exercise, you will use columns with 14 spaces.

To add spaces to your columns, type:

/G	starts GLOBAL command
C	column width
14	number of spaces per column
RETURN	executes the command

The VisiCalc worksheet format normally calculates values in a column-by-column sequence, starting in the left-most column and continuing to the right. In this exercise, a number of formulas require row-by-row calculation to be in proper sequence. The VisiCalc worksheet may be changed to a top-to-bottom row-by-row calculating sequence with a format change.

To change the order of calculation, type:

/G	starts GLOBAL command
O	order of calculation
R	calculates by row

To enter your column headings, place your cursor where you wish to make the entry and type:

/F	starts FORMAT command
R	justifies right

Type in your column title. Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines, place your cursor in the left-most column of the row where you want the line (line All in this example).

```
          A          B          C          D          E          F          G          H

1     INVOICE NUMBER
2
3     CUSTOMER NAME
4          ADDRESS :
5            CITY :
6           STATE :            ZIP CODE:
7
8     SALESPERSON NO                   DATE :
9
10          QUANTITY     ITEM NO.   DESCRIPTION     UNIT COST    TOTAL COST
11    ------------------------------------------------------------------
12
13
14
15
16
17
18
19
20    ==================================================================
21                                              FREIGHT :
22                                            SUB TOTAL :
23                                             DISCOUNT :
24                                                 NET :
25                                        5.4   SALES TAX :
26                                                          ==============
27                                           GRAND TOTAL :
28
29    SALESPERSON  COMMISSION RPT.
30    ---------------------------
31    SALESPERSON NO
32    INVOICE NUMBER
33      COMMISSION :
34
35    ---------------------------          ---------------------------          ---------------------------
36    PRICING TABLE                          PRICING TABLE                          DISCOUNT TABLE
37    FOR PAPER PRO.          PRICE          FOR GLASS WARE          PRICE          AMOUNT        PERCENT
38    ---------------------------          ---------------------------          ---------------------------
39                0            0                      0            0                  0            0
40              100          .55                    200          .36                100           10
41              125          .25                    225          .59                200           12
42              128         1.33                    226         1.23                300           15
43              129          .63                    230          .89                500           18
44              130          .75                    255         3.25
45              131         1.58                    275         1.45
46              132         2.36                    276          .65
47              133            0                    280            0
```

Figure 1

Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B11	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
E11	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on your invoice, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in Figure 2.

The first formula will search two reference tables for the inventory number (ITEM NO.) listed on the invoice, pick up the price listed in the table to the right of that number and enter it in the UNIT COST column on the invoice. The tables in this exercise have been purposely set up to demonstrate multi-table search capability. Because of the unique features contained in this operation, an extensive description of the logic has been provided.

The LOOKUP function is used to control selection of the appropriate table and to locate the desired value in the selected table. Two LOOKUP functions are used in this example, to search for the desired value in each of two tables.

	A	B	C	D	E	F	G	H
1	INVOICE NUMBER							
2								
3	CUSTOMER NAME							
4	ADDRESS :							
5	CITY :							
6	STATE :		ZIP CODE:					
7								
8	SALESPERSON NO			DATE :	@MAX(@LOOKUP(B12,A39...A47),@LOOKUP(B12,D39...D47))			
9								
10	QUANTITY	ITEM NO.	DESCRIPTION	UNIT COST	TOTAL COST			
11	----------				----------			
12				0	0.00	+A12*D12		
13				0	0.00			
14				0	0.00			
15				0	0.00			
16				0	0.00			
17				0	0.00			
18				0	0.00			
19				0	0.00			
20	==========							
21	@LOOKUP(@SUM(E11...E20),G39...G43)			FREIGHT :	0.00			
22				SUB TOTAL :	0.00	@SUM(E11...E21)		
23			0	DISCOUNT :	0.00	-@SUM(E11...E20)*C23/100		
24				NET :	0.00	@SUM(E22,E23)		
25			5.4	SALES TAX :	0.00	+E24*C25/100		
26					==========			
27				GRAND TOTAL :	0.00	@SUM(E24,E25)		
28								
29	SALESPERSON COMMISSION RPT.							
30	----------							
31	SALESPERSON NO	0	+B8					
32	INVOICE NUMBER	0	+B1					
33	COMMISSION :	0.00	(@MIN(E24,100)*.1)+(@MAX(0,@MIN(E24-100,200))*.12)+(@MAX(0,E24-300)*.15)					
34								
35	----------			----------			----------	
36	PRICING TABLE			PRICING TABLE			DISCOUNT TABLE	
37	FOR PAPER PRO.	PRICE		FOR GLASS WARE	PRICE		AMOUNT	PERCENT
38	----------			----------			----------	
39	0	0		0	0		0	0
40	100	.55		200	.36		100	10
41	125	.25		225	.59		200	12
42	128	1.33		226	1.23		300	15
43	129	.63		230	.89		500	18
44	130	.75		255	3.25			
45	131	1.58		275	1.45			
46	132	2.36		276	.65			
47	133	0		280	.35			

Figure 2

When a LOOKUP function fails to detect a value as large as that it has been asked to search for, it will select the largest value in the table and enter the number to the right of it into the formula. To accommodate the LOOKUP search from the end of one column to the beginning of the next, zero has been listed to the right of the last number in each column. If the LOOKUP number is larger than the last number in a column, it will pick up and enter the value opposite the last number in the formula.

If the LOOKUP value is smaller than the first whole number in a table, it will display ERROR. In this exercise, zero has been listed in the first position of each table to enable the LOOKUP function to pick up and use the number to the right of that first listing when the first whole number is less than the LOOKUP number. The value 0 is listed to the right of these first position entries to supply that value to the formula.

In the table containing the LOOKUP value, the LOOKUP function will pick up and enter the number to the right of that value into the formula. In the table not containing the LOOKUP value, the LOOKUP function will pick up and list zero into the formula. The formula is constructed to select the largest value selected by the LOOKUP functions contained within it.

Place your cursor on D12 and type:

@MAX(	selects the maximum value of the following list
@LOOKUP(	starts LOOKUP function
B12,	coordinate containing value to look up
A39	first coordinate in the reference table
.	ellipsis ... indicating from-to
A47)	last coordinate in the reference table
,	comma-separates values in the list
@LOOKUP(	starts LOOKUP function
B12,	coordinate containing value to look up

D39	first coordinate in the reference table
.	ellipsis ... indicating from-to
D47))	last coordinate in the reference table
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

The second formula multiplies the UNIT COST by QUANTITY and displays it in the TOTAL COST column in dollars and cents format.

Place your cursor on E12 and type:

+A12	picks up coordinate containing value from QUANTITY column
*	multiplies
D12	picks up coordinate containing value from UNIT COST column
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Your next operation is to copy the formulas just entered at the top of each column into each row in the respective columns.

Place your cursor on D12 and type:

/R	starts REPLICATE command
E12	copies all entries across columns D12 to E12
RETURN	prepares to receive additional information
D13	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to

D19	last coordinate where you wish to copy the formulas down columns
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location
N N R N N R R	tells the command to copy the coordinate address in the formula in its new location without change

Your next formula will add the sum of the values in the TOTAL COST column above the double-dashed line and the FREIGHT value. The answer will be displayed as SUB TOTAL, in dollars and cents format.

Place your cursor on E22 and type:

@SUM(	adds values in the list
E11	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to
E21)	last coordinte of the column that you wish to add
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

You will now enter a LOOKUP function that will use the sum of the TOTAL COST column to select an appropriate discount rate from the DISCOUNT TABLE (containing a graduated set of values) and display it to the left of DISCOUNT.

Place your cursor on C23 and type:

@LOOKUP(	starts LOOKUP function
@SUM(	adds values in the list
E11	first coordinate of the column that you wish to add

.	ellipsis ... indicating from-to
E20)	last coordinate of the column that you wish to add
,	comma-separates LOOKUP value from discount table coordinates
G39	first coordinate in the discount table
.	ellipsis ... indicating from-to
G43)	last coordinate in the discount table
RETURN	enters the formula

The next formula will add the sum of the TOTAL COST column above the double-dashed line, multiply the result by the discount rate and divide the answer by 100 to arrive at a percentage value. The resulting discount allowance will be displayed on the DISCOUNT line in dollars and cents as a negative value.

Place your cursor on E23 and type:

-@SUM(	adds values in the list and displays the result as a negative value
E11	first coordinate of the column that you wish to add
.	ellipsis ... indicates from-to
E20)	last coordinate of the column that you wish to add
*	multiplies
C23	coordinate containing value
/	divides
100	value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

A simple SUM formula will now be entered to calculate the value of the SUB TOTAL less DISCOUNT. The result will be displayed on the NET line in dollars and cents format.

Place your cursor on E24 and type:

@SUM(	adds values in the list
E22	coordinate containing value
,	comma-separates values in the list
E23)	coordinate containing value
RETURN	enters formula
/F	starts FORMAT command
$	displays in dollars and cents

To determine sales tax on the net invoiced value, you must first enter the sales tax rate, then enter a formula that will multiply the NET value times that rate and divide the result by 100 to arrive at a percentage value. The tax amount will then be displayed on the SALES TAX line in dollars and cents format.

Place your cursor on C25 and type:

5.4	sales tax rate used in the example
RETURN	enters the value

Place your cursor on E25 and type:

+E24	coordinate containing value to be multiplied by the sales tax rate
*	multiplies
C25	coordinate containing the sales tax rate value
/	divides
100	value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Now enter a formula to add the NET and the SALES TAX values. The result will display on the GRAND TOTAL line in dollars and cents format.

Place your cursor on E27 and type:

@SUM(	adds values in the list
E24	coordinate containing value
,	comma-separates values in the list
E25)	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

The final set of formulas will record the invoice and salesman's numbers on the SALESPERSON COMMISSION RPT., and calculate the salesperson's commission. The commission will be determined by comparing the invoice NET value against a set of graduated values, then multiplying the NET value by the appropriate commission percentages. Commission rates used in this example are: 10 percent on the first $100, 12 percent on the next $200, and 15 percent on amounts over $300. The commission amount will be displayed on the COMMISSION line in dollars and cents format.

Place your cursor on B31 and type:

+B8	enters the value in B8 in B31
RETURN	enters the formula

Place your cursor on B32 and type:

+B1	enters the value in B1 in B32
RETURN	enters the formula

Place your cursor on B33 and type:

(@MIN(E24,100)	selects the minimum value, the value in E24 or 100
*	multiplies
.10)	sales commission percentage
+	adds

(@MAX(0,@MIN(E24-100,200))	selects the maximum value from the comparison of 0 and the minimum value derived by comparing the value in E24 minus 100, and 200
*	multiplies
.12)	sales commission percentage
+	adds
(@MAX(0,E24-300)	selects the maximum value, 0 or the value in E24 minus 300
*	multiplies
.15)	sales commission percentage
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Your Customer Invoice and Sales Commission Report format is now complete and ready for you to type in invoicing information and sales entries.

To observe the automatic functions of your invoice sheet, type entries into the QUANTITY and ITEM NO. columns. Some sample entries are contained in Figure 3.

	A	B	C	D	E	F	G	H
1	INVOICE NUMBER	123589						
2								
3	CUSTOMER NAME ACME COMPANY							
4	ADDRESS :SW PINE ST							
5	CITY :PORTLAND							
6	STATE :OREGON		ZIP CODE:	97523				
7								
8	SALESPERSON NO	22	DATE :JULY 14.81					
9								
10	QUANTITY	ITEM NO.	DESCRIPTION	UNIT COST	TOTAL COST			
11	----------							
12	12	225		.59	7.08			
13	125	132		2.36	295.00			
14	25	255		3.25	81.25			
15	36	125		.25	9.00			
16	48	129		.63	30.24			
17				0	0.00			
18				0	0.00			
19				0	0.00			
20	==========							
21				FREIGHT :	0.00			
22				SUB TOTAL :	422.57			
23			15	DISCOUNT :	-63.39			
24				NET :	359.18			
25			5.4	SALES TAX :	19.40			
26					==========			
27				GRAND TOTAL :	378.58			
28								
29	SALESPERSON COMMISSION RPT.							
30	----------							
31	SALESPERSON NO	22						
32	INVOICE NUMBER	123589						
33	COMMISSION :	42.88						
34								
35	----------		----------			----------		
36	PRICING TABLE		PRICING TABLE			DISCOUNT TABLE		
37	FOR PAPER PRO.	PRICE	FOR GLASS WARE	PRICE		AMOUNT	PERCENT	
38	----------		----------			----------		
39	0	0	0	0		0	0	
40	100	.55	200	.36		100	10	
41	125	.25	225	.59		200	12	
42	128	1.33	226	1.23		300	15	
43	129	.63	230	.89		500	18	
44	130	.75	255	3.25				
45	131	1.58	275	1.45				
46	132	2.36	276	.65				
47	133	0	280	0				

Figure 3

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE THREE

COST RECOVERY

DESCRIPTION

In this exercise, you will use the VisiCalc ability to select the minimum or maximum of values when compared to a fixed value. The exercise is designed to record a declining balance as entries accumulate against the fixed value. An increasing positive balance is recorded when the fixed value is surpassed.

To demonstrate VisiCalc's abilities, a Cost Recovery worksheet has been set up listing the equipment stocked by an equipment rental company. Each piece of equipment offered for rent has been listed, and the purchase price entered in the ledger. As the company receives rental income from the equipment, the cumulative amount is entered on the ledger sheet once a month. Your ledger format deducts the rental income from the purchase price of the item rented and displays the declining balance until the full cost is recovered. It then enters the above-cost profits as they accumulate. Once a month, an operation is performed to advance the ageing record of the equipment listed, providing a record of how long each piece of equipment has been in service, and to update the ledger.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Making Ledger Entries

Ledger Updating

Making Additional Entries

Saving

Printing

FUNCTIONS USED

MAX
ABS
MIN
SUM
! recalculate total ledger

COMMANDS USED

REPEAT LABEL	
FORMAT	R = justifies right
FORMAT	I = integer
GLOBAL	$ = dollars and cents format
STORAGE	# = saves a Data Interchange Format file
REPLICATE	copies
INSERT	R = row
BLANK	delete entry

SETTING UP THE FORMAT

To set up your ledger sheet, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

```
      A       B       C       D       E       F       G       H       I       J       K

 1  ITEM     PURCHASE    RENT   INVEST  MTHS IN  PROFIT            WORK AREA
 2  NAME       PRICE    REC'D  BALANCE  SERVICE  MARGIN                 BALANCE  SERVICE   MARGIN
 3  ------------------------------------------------------        ------------------------------------
 4
 5
 6
 7
 8
 9
10
11          ==========================================
12
```

Figure 1

To format all locations to display value entries in dollars and cents, type:

/G	starts GLOBAL command
F	FORMAT
$	dollars and cents

To enter your column headings, place your cursor where you wish to make the entry and type:

/F	starts the FORMAT command
R	justifies right

Type in your column title.
Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings, using the sequence of commands above.

To enter dashed lines on your ledger sheet, place your cursor on the left-most column of the row where you want the line (A3 in this example).

Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, leave your cursor where it is, and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B3	first coordinate in the row, from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
K3	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between columnn and row

positions. The formulas and their locations are illustrated in Figure 2.

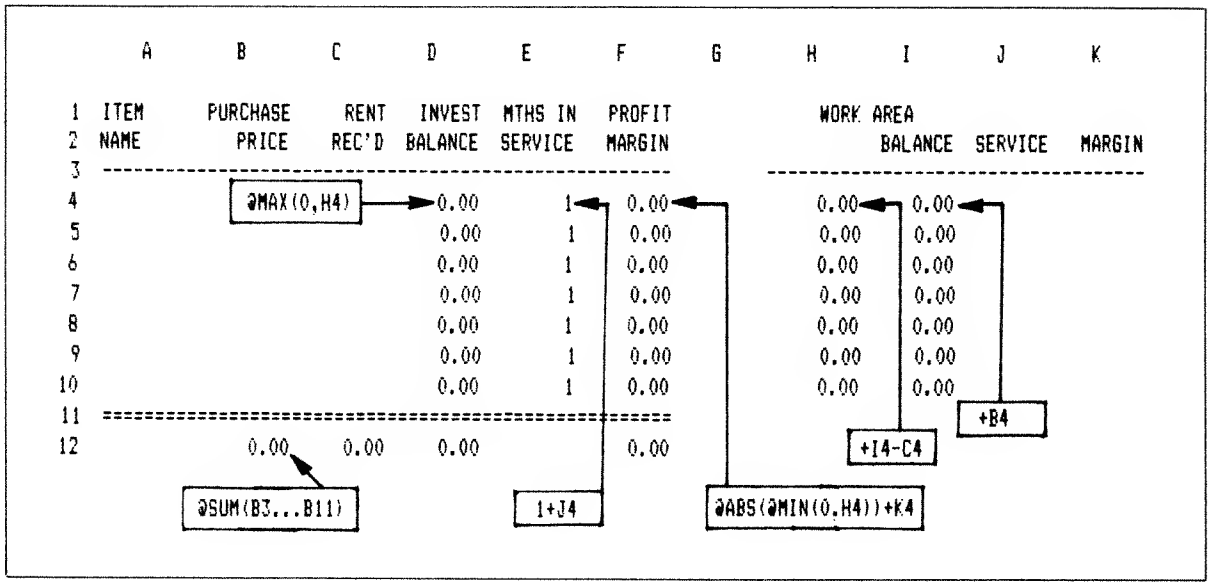

Figure 2

The first formula will provide a means for the INVEST BALANCE column to display the unrecovered purchase cost of each item listed. When the full purchase cost of each piece of equipment is recovered, the INVEST BALANCE column will display 0.00 opposite that item.

Place your cursor on D4 and type:

@MAX(0,H4)	selects the maximum value, 0, or the value in H4
RETURN	enters the formula

The second formula advances the number in the MTHS IN SERVICE column by one each time the updating operation is performed.

Place your cursor on E4 and type:

1+J4	adds 1 to the value in J4
RETURN	enters the formula
/F	starts FORMAT command
I	displays the value as an integer

The next formula displays accumulated gross profits in the PROFIT MARGIN column when purchase cost of the listed item has been recovered.

Place your cursor on F4 and type:

@ABS	reads the answer to the following calculation as an absolute function
(@MIN(0,H4))	selects the minimum value, 0, or the value in H4
+K4	adds the value in K4 to the answer to the preceding calculation
RETURN	enters the formula

Formula four performs a rental income deduction function in the WORK AREA columns.

Place your cursor on H4 and type:

+I4-C4	subtracts the value in I4 from the value in C4
RETURN	enters the formula

The fifth formula displays the original purchase price in a WORK AREA column.

Place your cursor on I4 and type:

+B4	enters the value in B4 in I4
RETURN	enters the formula

Your next operation is to copy the formulas just entered at the top of each column into each row in the respective columns.

Place your cursor on D4 and type:

/R	starts REPLICATE command
I4	copies all entries across columns D4 to I4
RETURN	prepares to receive additional information
D5	first coordinate where you wish to copy the formulas down columns

.	ellipsis ... indicating from-to
D10	last coordinate where you wish to copy the formulas down columns
RETURN	executes the command and prepares to receive additional instructionss
R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location

To display the sum of the entries in each column, it is necessary to enter a formula at the bottom that will add the values.

Place your cursor on B12 and type:

@SUM(	adds values in the list
B3	first coordinate of the column that you wish to add
.	ellipsis ... indicates from-to
B11)	last coordinate of the column that you wish to add
RETURN	enters the formula

Your next operation is to copy the formula just entered at the bottom of each column you wish to add.

Leave your cursor on B12 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in B12
C12	first coordinate where you wish to copy the formula across columns
.	ellipsis ... indicating from-to
F12	last coordinate where you wish to copy the formula across columns

RETURN	executes the command and prepares to receive additional instructions
R R	tells the commaned to copy the coordinate address in the formula relative to its new location

You won't need the SUM formula at the bottom of the MTHS IN SERVICE column, so place your cursor on E12 and type:

/B	starts BLANK command
RETURN	executes the command

MAKING LEDGER ENTRIES

Your Cost Recovery Ledger is now set up so once a month all you have to do is perform the update process, described in the next section, and make current billing entries. To get your ledger operational, type in the entries in the ITEM NAME, PURCHASE PRICE and RENT REC'D columns in Figure 3 exactly as they are shown.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT			WORK AREA		
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN			BALANCE	SERVICE	MARGIN
3											
4	HAMMER	25.00	5.00	20.00	1	0.00		20.00	25.00		
5	TRAILER	675.00	155.00	520.00	1	0.00		520.00	675.00		
6	SHOVEL	55.00	89.00	0.00	1	34.00		-34.00	55.00		
7	BIKE	255.00	15.55	239.45	1	0.00		239.45	255.00		
8	TRUCK	6500.00	250.00	6250.00	1	0.00		6250.00	6500.00		
9	MOTOR	152.00	225.00	0.00	1	73.00		-73.00	152.00		
10	AX	89.00	18.00	71.00	1	0.00		71.00	89.00		
11											
12		7751.00	757.55	7100.45		107.00					

Figure 3

LEDGER UPDATING

The first operation in the updating process is to transfer the values in the INVEST BALANCE, MTHS IN SERVICE and PROFIT MARGIN columns into a storage file on a disk. The values will be filed under the name MO.TOTALS. You will then recall the file and reenter the values into WORK AREA columns I, J and K.

Place your cursor on D4 (the upper-left coordinate of the rectangular area of your ledger sheet you wish to copy into the storage file).

Type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
MO.TOTALS	name of file; do not type spaces between words
RETURN	prepares to receive additional information
F10	lower-right coordinate of the rectangle of value entries to be saved
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

Your next operation will be to recall the stored MO.TOTAL file and position reenter the values in WORK AREA columns I, J and K.

Place your cursor on I4 (the upper-left coordinate of the ledger sheet area where you wish to reenter the stored values).

Type:

/S	starts STORAGE command
#	loads a (DIF) Data Interchange Format file
L	loads
MO.TOTALS	name of file; do not type spaces between words
RETURN	prepares to receive additional instructions
C	reenters the values in column format and executes the command

Now clear the RENT REC'D column.

Place your cursor on C4 and type:

/B	starts BLANK command
RETURN	clears the entry

Next, copy the blank in C4 down the remainder of the RENT REC'D column.

Type:

/R	starts REPLICATE command
RETURN	tells the command to copy the blank your cursor is on
C5	first coordinate where you wish to copy the blank down the column
.	ellipsis ... indicating from-to
C10	last coordinate where you wish to copy the blank down the column
RETURN	executes the command

Your ledger sheet should now look exactly like Figure 4.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN			BALANCE	SERVICE	MARGIN
3											
4	HAMMER	25.00		20.00	2	0.00		20.00	20.00	1.00	0.00
5	TRAILER	675.00		320.00	2	0.00		520.00	520.00	1.00	0.00
6	SHOVEL	55.00		0.00	2	54.00		0.00	0.00	1.00	34.00
7	BIKE	255.00		239.45	2	0.00		239.45	239.45	1.00	0.00
8	TRUCK	6500.00		3750.00	2	0.00		6250.00	6250.00	1.00	0.00
9	MOTOR	152.00		0.00	2	98.00		0.00	0.00	1.00	73.00
10	AX	89.00		26.00	2	0.00		71.00	71.00	1.00	0.00
11											
12		7751.00	0.00	4355.45		152.00					

Figure 4

Your ledger is now ready for entry of the rental incomes for the preceding month. Type the entries in Figure 5 into the appropriate spaces in the RENT REC'D column.

When you have completed your RENT REC'D entries, type:

!	recalculate all formulas
!	

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN			BALANCE	SERVICE	MARGIN
3											
4	HAMMER	25.00	35.00	0.00	2	15.00		-15.00	20.00	1.00	0.00
5	TRAILER	675.00	200.00	320.00	2	0.00		320.00	520.00	1.00	0.00
6	SHOVEL	55.00	20.00	0.00	2	54.00		-20.00	0.00	1.00	34.00
7	BIKE	255.00		239.45	2	0.00		239.45	239.45	1.00	0.00
8	TRUCK	6500.00	2500.00	3750.00	2	0.00		3750.00	6250.00	1.00	0.00
9	MOTOR	152.00	25.00	0.00	2	98.00		-25.00	0.00	1.00	73.00
10	AX	89.00	45.00	26.00	2	0.00		26.00	71.00	1.00	0.00
11											
12		7751.00	2825.00	4335.45		167.00					

Figure 5

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE FOUR

PRODUCTION SCHEDULING

DESCRIPTION

You will use the ability of VisiCalc to calculate a value from a variable number base in this exercise. Movement of entire rows containing label and value entries, and recalculation of values as a result of those moves, are demonstrated; and VisiCalc's split window capability will be used to observe two sections of the worksheet at the same time. Changing the standard calculation sequence of the worksheet is also illustrated in this exercise.

To demonstrate VisiCalc's ability, a Production Scheduling worksheet for a stained glass lamp manufacturer has been set up to utilize the features described. Three weeks of plant production time are illustrated. The total number of shop hours available per week is entered, and this number is measured against the estimated hours required to complete customer work orders.

The scheduling sheet totals the number of shop hours in each department, calculates the remaining hours to maximum shop capacity and the percentage measurement of those remaining hours. A plant production summary displays the hourly totals for each week in the schedule, and the grand totals for the combined period.

Customer orders may be repositioned on the scheduling sheet from one week to another for planning or rescheduling purposes. The scheduling sheet will recalculate all values relative to the repositioning. With the entry of the month and the date of the first Monday of the scheduled week, the correct month and date will automatically be entered for the remaining sequential weeks.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Making Scheduling Sheet Entries

Rescheduling Entries

Making Additional Entries

Saving

Printing

FUNCTIONS USED

AVERAGE	
LOOKUP	
INT	Integer
SUM	
MIN	

COMMANDS USED

REPEAT LABEL	
FORMAT	I = integer
REPLICATE	copies
INSERT	R = row
MOVE	R = row
GLOBAL	0 = order of calculation
WINDOW	

SETTING UP THE FORMAT

To set up your production scheduling sheet, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

The VisiCalc worksheet format normally calculates values in a column-by-column sequence, starting in the left-most column and continuing to the right. In this exercise, a number of formulas require row-by-row calculation to be in proper sequence. The VisiCalc worksheet may be changed to a top-to-bottom row-by-row calculating sequence with a format change.

To change the order in which the worksheet will be calculated, type:

/G	starts GLOBAL command
0	order of calculation
R	calculates by row

To enter your column headings, type:

/F	starts FORMAT command
R	justifies right

Type in your column title. Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

```
        A       B       C       D       E       F       G       H       I       J       K       L

1     MAX NUMBER OF SHOP HOURS IN A WEEK =     200
2     ---------------------------------------------------------------------------
3        MONTH              MONDAY'S DATE                      DAYS/MTH.
4     ---------------------------------------------------------------------------
5                        PATTERN     CUT   ASSEM-    SHIP    EST.   PCT OF  HRS VS.
6     JOB NO   CUSTOMER   MAKING    GLASS     BLE            HOURS  MAX HRS  MAX HRS
7     ---------------------------------------------------------------------------
8
9
10
11    ===========================================================================
12    TOTALS
13    ---------------------------------------------------------------------------
14       MONTH              MONDAY'S DATE                      DAYS/MTH.
15    ---------------------------------------------------------------------------
16                       PATTERN     CUT   ASSEM-    SHIP    EST.   PCT OF  HRS VS.
17    JOB NO   CUSTOMER   MAKING    GLASS     BLE            HOURS  MAX HRS  MAX HRS
18    ---------------------------------------------------------------------------
19
20
21
22    ===========================================================================
23    TOTALS
24    ---------------------------------------------------------------------------
25       MONTH              MONDAY'S DATE                      DAYS/MTH.
26    ---------------------------------------------------------------------------
27                       PATTERN     CUT   ASSEM-    SHIP    EST.   PCT OF  HRS VS.
28    JOB NO.  CUSTOMER   MAKING    GLASS     BLE            HOURS  MAX HRS  MAX HRS
29    ---------------------------------------------------------------------------
30
31
32
33    ===========================================================================
34    TOTALS
35    ---------------------------------------------------------------------------
36                     PLANT PRODUCTION SUMMARY
37    ---------------------------------------------------------------------------
38              MONDAY'S PATTERN     CUT   ASSEM-    SHIP    EST.   PCT OF  HRS VS.
39       MONTH   DATE    MAKING    GLASS     BLE            HOURS  MAX HRS  MAX HRS
40    ---------------------------------------------------------------------------
41
42
43
44    ===========================================================================
45    TOTALS
46
47    ---------------------------------------------------------------------------------------------
48                     DAYS IN THE MONTH TABLE
49    ---------------------------------------------------------------------------------------------
50          1       2       3       4       5       6       7       8       9      10      11      12
51         31      28      31      30      30      30      31      31      30      31      30      31
52    ---------------------------------------------------------------------------------------------
53    TABLE "A"                        TABLE "B"                TABLE "C"
54    -------------------------        -----------------        -----------------
55        .001       1   1.001            .001   1.001                0      13
56           0       1       0               0       1               13       1
57    -------------------------        -----------------        -----------------
```

Figure 1

To enter dashed lines on your ledger sheet, place your cursor on the left-most column of the row where you want the line (A3 in this example).

Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B2	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
I2	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their positions are illustrated in Figure 2.

Your first formula will total the estimated hours from the PATTERN MAKING, CUT GLASS, ASSEMBLE and SHIP columns in the EST. HOURS column.

Place your cursor on G8 and type:

@SUM(	adds values in the list

```
        A       B       C       D       E       F       G       H       I       J       K       L

1     MAX NUMBER OF SHOP HOURS IN A WEEK =     200
2     ------------------------------------------------------------------------------------------
3        MONTH                 MONDAY'S DATE                        DAYS/MTH        30   @LOOKUP(B3 ,A50...L50)
4     ------------------------------------------------------------------------------------------
5                        PATTERN      CUT   ASSEM-     SHIP     EST.   PCT OF  HRS VS.
6     JOB NO   CUSTOMER   MAKING     GLASS     BLE             HOURS  MAX HRS  MAX HRS
7     ------------------------------------------------------------------------------------------
8                                   @SUM(C8...F8)                 0        0        +G8/E1*100
9                                                                 0        0
10            @SUM(C7...C11)                                      0        0
11    ==========================================================================================
12    TOTALS                    0       0       0       0       0       0     -200   +G12-E1
      @MIN(B3+@LOOKUP(F3+7/13,E55...F55),@LOOKUP(B3+@LOOKUP(F3+7/13,E55...F55),H55...I55))
13                                  (((F3+7/I3)+@LOOKUP(F3+7/I3,A55...C55))-(@INT(F3+7/I3)))*I3
14'      MONTH        0          MONDAY'S DATE            7          DAYS/MTH        30
15    ------------------------------------------------------------------------------------------
16                       PATTERN      CUT   ASSEM-     SHIP     EST.   PCT OF  HRS VS.
17    JOB NO   CUSTOMER   MAKING     GLASS     BLE             HOURS  MAX HRS  MAX HRS
18    ------------------------------------------------------------------------------------------
19                                                                0        0
20                                                                0        0
21                                                                0        0
22    ==========================================================================================
23    TOTALS                    0       0       0       0       0       0     -200
24    ------------------------------------------------------------------------------------------
25       MONTH        0          MONDAY'S DATE           14          DAYS/MTH        30
26    ------------------------------------------------------------------------------------------
27                       PATTERN      CUT   ASSEM-     SHIP     EST.   PCT OF  HRS VS.
28    JOB NO.  CUSTOMER   MAKING     GLASS     BLE             HOURS  MAX HRS  MAX HRS
29    ------------------------------------------------------------------------------------------
30                                                                0        0
31                                                                0        0
32                                                                0        0
33    ==========================================================================================
34    TOTALS                    0       0       0       0       0       0     -200
35    ------------------------------------------------------------------------------------------
36                     PLANT PRODUCTION SUMMARY
37    ------------------------------------------------------------------------------------------
38              MONDAY'S PATTERN      CUT   ASSEM-     SHIP     EST.   PCT OF  HRS VS.
39       MONTH    DATE    MAKING     GLASS     BLE             HOURS  MAX HRS  MAX HRS
40    ------------------------------------------------------------------------------------------
41    +B3      0  +F3     0  +C12    0       0       0       0       0       0     -200
42    +B14     0  +F14    7  +C23    0       0       0       0       0       0     -200
43    +B25     0  +F25   14  +C34    0       0       0       0       0       0     -200
44    ==========================================================================================
45    TOTALS                  0       0       0       0       0       0       0     -600   @AVERAGE(H40...H44)
46                  @SUM(C40...C44)
47    ------------------------------------------------------------------------------------------
48                     DAYS IN THE MONTH TABLE
49    ------------------------------------------------------------------------------------------
50          0       2       3       4       5       6       7       8       9      10      11      12
51         31      28      31      30      30      30      31      31      30      31      30      31
52    ------------------------------------------------------------------------------------------
53    TABLE "A"                       TABLE "B"                 TABLE "C"
54    -------------------------       -----------------         -----------------
55       .001       1   1.001            .001   1.001                0      13
56          0       1       0               0       1               13       1
57    -------------------------       -----------------         -----------------
```

Figure 2

C8	first coordinate of the column that you wish to add
.	ellipsis ... indicates from-to
F8)	last coordinate of the column that you wish to add
RETURN	enters the formula

To calculate the percent each work order represents of the maximum hours available in the week, the next formula divides the EST. HOURS column total for individual work orders by the maximum hours available. The result is multiplied by 100 to display the percentage value as a whole number.

Place your cursor on H8 and type:

+	prepares coordinate to accept a numeric expression
G8	coordinate containing value
/	divides
E1	coordinate containing value
*	multiplies
100	value
RETURN	enters the formula
/F	starts FORMAT command
I	displays the value as an integer

Your next operation is to copy the formulas just entered into the remaining rows in their respective columns down to the dashed line.

Place your cursor on G8 and type:

/R	starts REPLICATE command
H8	copies all entries across columns G8 to H8
RETURN	prepares to receive additional information
G9	first coordinate where you wish to copy the formula down columns

.	ellipsis ... indicating from-to
G10	last coordinate where you wish to copy the formula down columns
RETURN	executes the command and prepares to receive additional instructions
R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

Now copy the formulas for the EST. HOURS and PCT OF MAX HOURS columns into the same columns in the following sequential weeks, one at a time.

Leave your cursor on G8 and type:

/R	starts REPLICATE command
H8	copies all entries across columns G8 to H8
RETURN	prepares to receive additional information
G19	first coordinate where you wish to copy the formula down columns
.	ellipsis ... indicates from-to
G21	last coordinate where you wish to copy the formula down columns
RETURN	executes the command and prepares to receive additional instructions
R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

To copy the formulas into the columns in the following sequential week, leave your cursor on G8 and type:

/R	starts REPLICATE command

H8	copies all entries across columns G8 to H8
RETURN	prepares to receive additional information
G30	first coordinate where you wish to copy the formula down columns
.	ellipsis ... indicates from-to
G32	last coordinate where you wish to copy the formula down columns
RETURN	executes the command and prepares to receive additional instructions
R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

The next formula will add the total of values in the PATTERN MAKING column.

Place your cursor on C12 and type:

@SUM(	adds values in the list
C7	first coordinate of the column that you wish to add
.	ellipsis ... indicates from-to
C11	last coordinate of the column that you wish to add
RETURN	enters the formula

Your next operation is to copy the formulas just entered at the bottom of each column you wish to add.

Leave your cursor on C12 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in C12

D12	first coordinate where you wish to copy the formula across columns
.	ellipsis ... indicating from-to
H12	last coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

The next formula will compare the total estimated hours against the maximum shop hours available and display the difference at the bottom of the HRS VS. MAX HRS column. A negative value indicates hours remaining; a positive value, hours exceeded.

Place your cursor on I12 and type:

+	prepares coordinate to accept a numeric expression
G12	coordinate containing value
-	subtracts
E1	coordinate containing value
RETURN	enters the formula

Your next operation is to copy the formulas just entered on the first week's TOTALS line into the TOTALS line of the next sequential week.

Place your cursor on C12 and type:

/R	starts REPLICATE COMMAND
I12	copies all entries across columns C12 to I12
RETURN	prepares to receive additional information
C23	first coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions

R R R R R R R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

Now, copy the formulas into the TOTALS line of the following sequential week or weeks, one at a time.

Leave your cursor on C12 and type:

/R	starts REPLICATE command
I12	copies all entries across columns C12 to I12
RETURN	prepares to receive additional information
C34	first coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions
R R R R R R R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

You will now enter a series of formulas into the production schedule to automatically advance the DAYS/MTH, MONTH and MONDAY'S DATE entries in subsequent weeks after manually entering the MONTH and MONDAY'S DATE in the first week. The DAYS/MTH entry for the first week will also calculate automatically following these two manual entries.

The DAYS/MTH entry will be obtained using the LOOKUP function and comparing the MONTH entry of that week to the DAYS IN THE MONTH TABLE to select and display the correct number of days for that month.

Place your cursor on I3 and type:

@LOOKUP(	starts LOOKUP function
B3	coordinate containing value to be looked up
,	comma-separates LOOKUP value from the reference table
A50	first coordinate of the reference table
.	ellipsis ... indicating from-to
L50)	last coordinate of the reference table
RETURN	enters the formula

Now copy the formula just entered into the DAYS/MTH entry position for the next sequential week.

Leave your cursor on I3 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in I3
I14	coordinate where you wish to copy the formula
RETURN	executes the command and prepares to receive additional instructions

R	tells the command to copy the coordinate address in the formula relative to its new location
N N	tells the command to copy the coordinate address in the formula in its new location without change

You may copy the DAYS/MTH formula into the final sequential week with the commands above, leaving your cursor on I3 and changing the coordinate to copy into (I25 in this example).

When the MONTH entry is made manually in the first work week of the production scheduling sheet, the appropriate MONTH entry is calculated and entered in the remaining sequential weeks. The calculation is performed using the MIN function and the LOOKUP function with reference tables.

The MIN function selects the minimum value from a list of values presented. The first value in the list will be generated by a LOOKUP value being added to the previous week's MONTH entry. First, seven is added to the MONDAY'S DATE entry from the previous week to advance it one week. The result is divided by the days in the month, taken from the DAYS/MTH entry of the previous week. The result of this division will be a fraction less than one, a number equal to one, or a number greater than one. This number is compared to the values in TABLE B. When the number is one or less than one, zero will be added to the previous week's MONTH entry. When the number is greater than one, the value one will be added to the previous week's MONTH entry.

The MIN function will select the lesser of the two values listed and display it as the appropriate MONTH entry. When the advancement is less than the remaining days in the month, the MIN value will be the same as the previous MONTH entry. When the advancement is more than the remaining days in the month, the MIN value will be the previous MONTH entry plus one. When the previous MONTH entry is 12 and the advancement is more than the remaining days in the month, the MIN value will be one.

Place your cursor on B14 and type:

@MIN(	selects the minimum value of the following list
B3	coordinate containing value
+	adds
@LOOKUP(	starts LOOKUP function

F3	the following formula generates the value to be looked up
+	adds
7	value
/	divides
I3	coordinate containing value
,	comma-separates LOOKUP value from the reference table
E55	first coordinate in the reference table
.	ellipsis ... indicating from-to
F55	last coordinate in the reference table
)	parenthesis-separates calculations within a formula
,	comma-separates values in the reference table
@LOOKUP(	starts LOOKUP function
B3	the following formula generates the value to be looked up
+	adds
@LOOKUP(	starts LOOKUP function
F3	coordinate containing value
+	adds
7	value
/	divides
I3	coordinate containing value
,	comma-separates LOOKUP value from the reference table
E55	first coordinate in the reference table
.	ellipsis... indicating from-to

F55	last coordinate in the reference table
)	parenthesis-separates calculations within the formula
,	comma-separates values in the reference table
H55	first coordinate in the reference table
.	ellipsis ... indicating from-to
I55))	last coordinate in the reference table
RETURN	enters the formula

Calculating MONDAY'S DATE in each sequential week following the manual entry of the MONTH AND MONDAY'S DATE in the first week is accomplished using the LOOKUP function with reference tables, and the INTEGER function.

The first calculation in the formula adds seven days to the previous MONDAY'S DATE entry to advance it one week. It then divides that number by the number of days in the month determined by the DAYS/MTH entry in the previous week. When the advancement is less than the number of days remaining in the month, the result of this calculation will be a fraction (representing the days used up in that month). When the advancement is more than the remaining days in the month, the result will be the value one and a fraction (the fraction portion representing the number of days advanced into the next month). When the new date falls on the last day of the month, the result will be one, with no fractional value.

In a later calculation, the INTEGER (the whole number to the left of the decimal) of above result will be subtracted from the value, and the remaining value mutiplied by the day in the month to determine the appropriate new date. When the advancement is less than the number of days remaining in the month, that INTEGER will be zero; when more than the days remaining in the month, the INTEGER will be one. In either case, when the INTEGER is subtracted, the fractional portion will remain, which is what you need for your calculation.

When the new date falls on the last day of the month, the INTEGER will be 1, with no fractional value. When this is the case, no value is left for computation when the INTEGER is subtracted. To correct for this condition, the LOOKUP function is used in your second calculation to compare the first calculation result to a table and determine if it is

less than one or greater than one, in which case a zero value will be added to the result. When the result is equal to one, the value one will be added, to give the value two. Now when the new date is the last day in the month and the INTEGER one is subtracted in the third calculation, the value one will remain to be multiplied by the days in the month (resulting in the date of the last day in the month).

The third calculation adds seven days to the previous MONDAY'S DATE entry and divides the result by the number in the DAYS/MTH entry for the previous week. The INTEGER function then selects and retains the whole number to the left of the decimal place. The result will be one or zero. This value is subtracted from the result of the previous calculations.

The final calculation multiplies the result of the first three calculations by the number of days in the month from the DAYS/MTH entry from the previous week. The result will be the appropriate date of the month, which will be displayed as MONDAY'S DATE.

Place your cursor on F14 and type:

(((F3	coordinate containing value
+	adds
7	value
/	divides
I3	coordinate containing value
)	parenthesis-separates calculations within the formula
+	adds
@LOOKUP(	starts LOOKUP function
F3	coordinate containing value to look up
+	adds
7	value
/	divides
I3	coordinate containing value

,	comma-separates LOOKUP value from the reference table
A55	first coordinate in the reference table
.	ellipsis ... indicating from-to
C55	last coordinate in the reference table
))	parentheses-separates calculations within a formula
-	subtracts
(@INT	integer-selects the value to the left of the decimal place
(F3	coordinate containing value
+	adds
7	value
/	divides
I3	coordinate containing value
)))	parentheses-separates calculations within the formula
*	multiplies
I3	coordinate containing value
RETURN	enters the formula

Now copy the MONTH, MONDAY'S DATE and DAYS/MTH formulas just entered into the appropriate positions in following subsequential weeks, one week at a time.

Place your cursor on B14 and type:

/R	starts REPLICATE COMMAND
I14	copies all entries across columns B14 to I14
RETURN	prepares to receive additional information
B25	first coordinate where you wish to copy the formulas across columns

RETURN	executes the command and prepares to receive additional instructions
R R R	tells the command to copy the coordinate address in the formula relative to its new location
N N	tells the command to copy the coordinate address in the formula in its new location without change

R
R
R
N
N
N
N
R
R
R
R
N
N
R
R
R
R
N
N

Next enter the formulas in the PLANT PRODUCTION SUMMARY that will transfer the MONTH, MONDAY'S DATE and the hourly values from the weekly production schedule totals.

Place your cursor on A41 and type:

+	prepares the coordinate to accept a numeric expression
B3	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on A42 and type:

+	prepares the coordinate to accept a numeric expression
B14	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on A43 and type:

+	prepares the coordinate to accept a numeric expression
B25	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on B41 and type:

+	prepares the coordinate to accept a numeric expression
F3	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on B42 and type:

+	prepares the coordinate to accept a numeric expression
F14	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on B43 and type:

+	prepares the coordinate to accept a numeric expression
F25	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on C41 and type:

+	prepares the coordinate to accept a numeric expression
C12	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on C42 and type:

+	prepares the coordinate to accept a numeric expression
C23	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on C43 and type:

+	prepares the coordinate to accept a numeric expression
C34	coordinate containing value to transfer
RETURN	enters the formula

Place your cursor on C45 and type:

@SUM(	adds values in the list
C40	first coordinate of the row that you wish to add
.	ellipsis ... indicating from-to
C44	last coordinate of the row that you wish to add
RETURN	enters the formula

Now, copy the prior four formulas entered into appropriate positions in columns to the right.

Place your cursor on C41 and type:

/R	starts REPLICATE command
C45	copies all entries from C41 to C45
RETURN	prepares to receive additional information
D41	first coordinate where you wish to copy formulas across columns
.	ellipsis ... indicating from-to
I41	last coordinate where you wish to copy formulas across columns

RETURN	executes the command and prepares to receive additional instructions
R R R R R	tells the command to copy the coordinate address in the formula relative to its new location

It will be necessary to replace the SUM formula in coordinate H45 with the AVERAGE function to obtain the correct percentage ratio of maximum hours used.

Place your cursor on H45 and type:

@AVERAGE(	averages the values in the following list
H40	first coordinate in the list
.	ellipsis ... indicates from-to
H44	last coordinate in the list
RETURN	enters the formula

MAKING SCHEDULE SHEET ENTRIES

Your production scheduling sheet is now ready for use. To perform the following operations, type in the entries in Figure 3 exactly as they are shown.

NOTE

> Never enter values in coordinates containing formulas, or the formulas will be erased.

RESCHEDULING ENTRIES

Your entire production scheduling sheet cannot be viewed on your computer screen because it is too long. To allow you to view the PLANT PRODUCTION SUMMARY as you move work orders from one week to another for rescheduling, you will now utilize the WINDOW command to split the screen horizontally in two. The PLANT PRODUCTION SUMMARY will be displayed in the lower window, and will remain stationary. The upper window will be used to scan the entire production scheduling sheet, selecting portions where changes will be made. The split window format is illustrated in Figure 4.

Position line 46 as the last line displayed on your screen. This will position your PLANT PRODUCTION SUMMARY in the lower half of your screen.

Place your cursor on A35 and type:

/W	starts WINDOW command
H	splits window horizontally
/W	starts WINDOW command
S	scrolls windows in synchronization

NOTE

Your cursor will be located in the upper window. You may move it from one window to the other by depressing the semicolon key (;).

To demonstrate how the production scheduling sheet recalculates values when a work order is moved for rescheduling, move the MCGRAY order from week one to week three.

Place your cursor on A9 and type:

/M	starts MOVE command
A31	row where entry will be moved to
RETURN	executes the command

	A	B	C	D	E	F	G	H	I	J	K	L
1	MAX NUMBER OF SHOP HOURS IN A WEEK =				200							
2												
3	MONTH	10	MONDAY'S DATE		5			DAYS/MTH. 31				
4												
5			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
6	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
7												
8	A300	JOHSON	45	58	25	5	133	67				
9	0325	MCGRAY	15	25	30		70	35				
10	0450	MIS CD.	17	12	15		44	22				
11												
12	TOTALS		77	95	70	5	247	124	47			
13												
14	MONTH	10	MONDAY'S DATE			12		DAYS/MTH. 31				
15												
16			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
17	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
18												
19	A150	MILFORD	25	31	18	1	75	38				
20	A550	RESTEASY	14	22	27	1	64	32				
21	D600	HARTFORD	16	15	15	1	47	24				
22												
23	TOTALS		55	68	60	3	186	93	-14			
24												
25	MONTH	10	MONDAY'S DATE			19		DAYS/MTH. 31				
26												
27			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
28	JOB NO.	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
29												
30	A800	RED FOX	15	20	12	1	48	24				
31	0425	WILLIT	13	15	15	1	44	22				
32	A225	DONIT	12	12	5	1	30	15				
33												
34	TOTALS		40	47	32	3	122	61	-78			
35												
36			PLANT PRODUCTION SUMMARY									
37												
38		**MONDAY'S**	PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
39	MONTH	DATE	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
40												
41	10	5	77	95	70	5	247	124	47			
42	10	12	55	68	60	3	186	93	-14			
43	10	19	40	47	32	3	122	61	-78			
44												
45	TOTALS		172	210	162	11	555	93	-45			
46												
47												
48			DAYS IN THE MONTH TABLE									
49												
50	1	2	3	4	5	6	7	8	9	10	11	12
51	31	28	31	30	30	30	31	31	30	31	30	31
52												
53	TABLE "A"			TABLE "B"			TABLE "C"					
54												
55	.001	1	1.001	.001	1.001		0	13				
56	0	1	0	0	1		13	1				
57												

Figure 3

```
         A        B        C        D        E        F        G

5                          PATTERN      CUT   ASSEM-     SHIP     EST.
6     JOB NO   CUSTOMER    MAKING    GLASS      BLE             HOURS
7     ------------------------------------------------------------------
8     A300     JOHSON         45       58       25        5      133
9     D325     MCGRAY         15       25       30               70
10    D450     MIS CO.        17       12       15               44
11    ==================================================================
12    TOTALS                  77       95       70        5      247

         A        B        C        D        E        F        G

36                     PLANT PRODUCTION SUMMARY
37    ------------------------------------------------------------------
38              MONDAY'S PATTERN      CUT   ASSEM-     SHIP     EST.
39       MONTH     DATE   MAKING    GLASS      BLE             HOURS
40    ------------------------------------------------------------------
41          12       23       77       95       70        5      247
42          12       30       55       68       60        3      186
43           1        6       40       47       32        3      122
44    ==================================================================
45    TOTALS                 172      210      162       11      555
46
```

Split Screen Before Work Order Move

```
         A        B        C        D        E        F        G

28    JOB NO.  CUSTOMER    MAKING    GLASS      BLE             HOURS
29    ------------------------------------------------------------------
30    A800     RED FOX        15       20       12        1       48
31    D325     MCGRAY         15       25       30               70
32    D425     WILLIT         13       15       15        1       44
33    A225     DONIT          12       12        5        1       30
34    ==================================================================
35    TOTALS                  55       72       62        3      192

         A        B        C        D        E        F        G

37                     PLANT PRODUCTION SUMMARY
38    ------------------------------------------------------------------
39              MONDAY'S PATTERN      CUT   ASSEM-     SHIP     EST.
40       MONTH     DATE   MAKING    GLASS      BLE             HOURS
41    ------------------------------------------------------------------
42          12       23       62       70       40        5      177
43          12       30       55       68       60        3      186
44           1        6       55       72       62        3      192
45    ==================================================================
46    TOTALS                 172      210      162       11      555
```

Split Screen After Work Order Move

Figure 4

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE FIVE

ESTIMATING

DESCRIPTION

Illustrated in this exercise are the abilities to utilize the calculating sequence of VisiCalc to calculate values for entry in a table before using that table for reference, and to select values from a set of tables for use in calculations.

To demonstrate VisiCalc's abilities, a Manufacturing Estimating worksheet has been designed for a pipe manufacturer. Following entry of the size parameters and the quantity and grade of material to be used, the estimating sheet will make a series of calculations automatically. Displayed as a result of the calculations will be the appropriate manufacturing machine to use, the amount and cost of material required, manufacturing time and cost, and total job costs.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Entering Parameters

Making Additional Entries

Saving

Printing

FUNCTIONS USED

LOOKUP	
SUM	
PI	3.1415926536
INT	integer

COMMANDS USED

REPEAT LABEL	
FORMAT	R = justifies right
STORAGE	saves
INSERT	R = row
BLANK	deletes entry

SETTING UP THE FORMAT

To set up your estimating sheet, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

To enter your column headings, type:

/F	starts FORMAT command
R	justifies right

Type in your column title.

Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your estimating sheet, place your cursor in the left-most column of the row where you want the line, and type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the additional columns, place your cursor on the column and repeat the above sequence.

To enter a double-dashed line on your estimating sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in Figure 2.

The first two formulas you will enter will generate the values for TABLE A. The diameter and length parameters of the pipe to be manufactured are used to select which machines are appropriate for the job from MACHINE TABLES 1 and 2. The resulting selections will appear in TABLE A, and will be used in a later calculation.

```
        A       B       C       D       E       F       G       H       I       J       K

1     MATERIAL GRADE :::
2     QUANTITY :::::::::
3     LENGTH   :::::::::
4     DIAMETER :::::::::
5
6             MACHINE  TO USE=
7             TOTAL SQ.FT.NEEDED
8             MANUFACTURE TIME
9             MANUFACTURE COST
10            MATERIAL COST
11                            =========
12            TOTAL JOB COST
13
14
15    -----------------
16    TABLE "A"
17    -----------------
18            1
19            2
20    -----------------
21    TABLE "B"
22    -----------------
23            1       1
24            4       2
25            5       1
26    -----------------
27    MACHINE TABLE # 1
28    -----------------
29            1       1
30            2       2
31            3       3
32            4      @NA
33            5       7
34    -----------------
35    MACHINE TABLE # 2
36    -----------------
37            0       4
38           20       5
39           25       6
40    -----------------       -----------------       -----------------       -----------------
41    MACHINE   HOURLY        MACHINE PRODUCTION      MAT'L    GRADE          PERCENT  OF COST
42    COST     TABLE          RATE TABLE              COST/SQFT TABLE         MARKUP   TABLE
43    MACHINE # PRICE/HR      MACHINE #  SQFT/HR      -----------------       -----------------
44    -----------------       -----------------            100     9.55             0      2.5
45            1    25.55             1       36             150     6.35           100     2.25
46            2    30.55             2       25             200     5.63           200        2
47            3    20.75             3       45             250     7.88           250     1.75
48            4    41.75             4       12             300     6.75           300     1.55
49            5    56.95             5       69                                    500     1.25
50            6    18.95             6       78
51            7   125.25             7       95
52    -----------------       -----------------
```

Figure 1

```
        A        B        C        D        E        F        G        H        I        J        K

1     MATERIAL GRADE :::      300
2     QUANTITY :::::::::        1
3     LENGTH   :::::::::        1
4     DIAMETER :::::::::        1
5
6             MACHINE  TO USE=          1 <- @LOOKUP (@LOOKUP(C4,A23...A25),A18...A19)
7             TOTAL SQ.FT.NEEDED        1 <- @INT(C4*@PI*C3*C2/144)+1
8             MANUFACTURE TIME          1 <- @INT(D7/@LOOKUP(D6,D45...D51))+1
9             MANUFACTURE COST      25.55 <- @LOOKUP(D6,A45...A51)*D8
10            MATERIAL COST         16.88 <- (@LOOKUP(C1,G44...G48)*@LOOKUP(D7,J44...J49))*D7
11                                =========
12            TOTAL JOB COST        42.425 <- @SUM(D9...D11)
13
14
15    -----------------
16    TABLE "A"          USED TO SELECT THE PROPER MACHINE
17    -----------------
18          1        1 <- @LOOKUP(C4,A29...A33)     TABLE #1
19          2        4 <- @LOOKUP(C3,A37...A39)     TABLE # 2
20    -----------------
21    TABLE "B"            USED TO DETERMINE WHAT MACHINE TABLE TO USE.
22    -----------------
23          1        1
24          4        2
25          5        1
26    -----------------
27    MACHINE TABLE # 1
28    -----------------
29          1        1
30          2        2
31          3        3
32          4       NA
33          5        7
34    -----------------
35    MACHINE TABLE # 2
36    -----------------
37          0        4
38         20        5
39         25        6
40    -----------------        -----------------        -----------------        -----------------
41    MACHINE   HOURLY         MACHINE PRODUCTION       MAT'L    GRADE           PERCENT  OF COST
42    COST     TABLE           RATE TABLE               COST/SQFT TABLE          MARKUP   TABLE
43    MACHINE # PRICE/HR       MACHINE #  SQFT/HR       -----------------        -----------------
44    -----------------        -----------------            100     9.55              0      2.5
45          1    25.55              1       36             150     6.35            100     2.25
46          2    30.55              2       25             200     5.63            200        2
47          3    20.75              3       45             250     7.88            250     1.75
48          4    41.75              4       12             300     6.75            300     1.55
49          5    56.95              5       69                                     500     1.25
50          6    18.95              6       78
51          7   125.25              7       95
52    -----------------        -----------------
```

Figure 2

Place your cursor on B18 and type:

@LOOKUP(	starts LOOKUP function
C4,	coordinate containing value to look up
A29	first coordinate of the reference table
.	ellipsis ... indicating from-to
A33)	last coordinate of the reference table
RETURN	enters the formula

Place your cursor on B19 and type:

@LOOKUP(	starts LOOKUP function
C3,	coordinate containing value to look up
A37	first coordinate of the reference table
.	ellipsis ... indicating from-to
A39)	last coordinate of the reference table
RETURN	enters the formula

The third formula first employs a LOOKUP within a LOOKUP function to compare the diameter of the pipe to a set of parameters in TABLE B and generates a reference number. That number is then used in TABLE A by the second LOOKUP function to select the appropriate machine to be used in the manufacturing operation.

Place your cursor on D6 and type:

@LOOKUP(	starts LOOKUP function
@LOOKUP(	starts LOOKUP function
C4,	coordinate containing value to look up
A23	first coordinate of the reference table
.	ellipsis ... indicating from-to

A25)	last coordinate of the reference table
,	comma-separates calculations within a formula
A18	first coordinate of the reference table
.	ellipsis ... indicating from-to
A19)	last coordinate of the reference table
RETURN	enters the formula

To determine the amount of flat material required to manufacture the pipe, the next formula first determines the pipe circumference in inches by multiplying the diameter times PI (3.1415926536). The circumference is then multiplied by the pipe length to find the material in one piece. The result is multiplied by the quantity to determine the total amount of material needed, then divided by 144 to convert the answer to square feet. The final quantity is carried to the next square foot by adding one and using the INTEGER function to select only the whole number to the left of the decimal place.

Place your cursor on D7 and type:

@INT(	selects the value to the left of the decimal point
C4	coordinate containing value
*	multiplies
@PI	3.1415926536 (multiplier)
*	multiplies
C3	coordinate containing value
*	multiplies
C2	coordinate containing value
/	divides
144)	value
+	adds

1	value
RETURN	enters the formula

The MANUFACTURING TIME to produce the number of pipes indicated is determined by dividing the square feet of material by the number of square feet per hour the selected machine will process. The LOOKUP function is used to find the production rate of the selected machine in the MACHINE PRODUCTION RATE TABLE. To round out the result to the next whole hour, one is added to the answer and the INTEGER function is used to select only the whole number to the left of the decimal point.

Place your cursor on D8 and type:

@INT(	selects the value to the left of the decimal point
D7	coordinate containing value
/	divides
@LOOKUP(	starts LOOKUP function
D6,	coordinate containing value to be looked up
D45	first coordinate of the reference table
.	ellipsis ... indicating from-to
D51	last coordinate in the reference table
))	parentheses-separates calculations within the formula
+	adds
1	value
RETURN	enters the formula

Your next formula will use the LOOKUP function to select the hourly cost rate of the machine being used from the MACHINE HOURLY COST TABLE. It then multiplies that rate times the hours listed for MANUFACTURING TIME to obtain the MANUFACTURING COST.

Place your cursor on D9 and type:

@LOOKUP(	starts LOOKUP function
D6,	coordinate containing value to be looked up
A45	first coordinate in the reference table
.	ellipsis ... indicating from-to
A51	last coordinate in the reference table
)	parenthesis-separates calculations within a formula
*	multiplies
D8	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Now enter the formula to calculate the MATERIAL COST. The LOOKUP function is first used to determine the material purchase cost from the MAT'S GRADE COSTS/SQ FT table. A second LOOKUP function is used to determine the percentage rate of the pricing markup from the PERCENT OF COST MARKUP table. The resulting values from these two LOOKUP functions are multiplied and the answer multiplied by the TOTAL SQ. FT. NEEDED value to obtain the MATERIAL COST.

Place your cursor on D10 and type:

@LOOKUP(	starts LOOKUP function
C1,	coordinate containing value to be looked up
G44	first coordinate in the reference table
.	ellipsis ... indicating from-to
G48	last coordinate in the reference table
)	parenthesis-separates calculations within a formula

*	multiplies
@LOOKUP(	starts LOOKUP function
D7,	coordinate containing value to be looked up
J44	first coordinate in the reference table
.	ellipsis ... indicating from-to
J49	last coordinate in the reference table
))	parentheses-separate calculations within the formula
*	multiplies
D7	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

The final mathematical formula on your estimating sheet will add the total of the values listed for MANUFACTURING COST and MATERIAL COST, and display the answer on the TOTAL JOB COST line.

Place your cursor on D12 and type:

@SUM(	adds values in the list
D9	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to
D11)	last coordinate of the column that you wish to add
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

ENTERING PARAMETERS

Your estimating sheet is now complete. To observe its operations, enter your measurement and material grade values on the appropriate lines at the top of the page (Figure 3).

```
        A       B       C       D       E       F       G       H       I       J       K

1     MATERIAL GRADE :::      300
2     QUANTITY :::::::::      150
3     LENGTH   :::::::::       30
4     DIAMETER :::::::::        4
5
6             MACHINE  TO USE=          6
7             TOTAL SQ.FT.NEEDED      393
8             MANUFACTURE TIME          6
9             MANUFACTURE COST     113.70
10            MATERIAL COST       4111.76
11                               =========
12            TOTAL JOB COST     4225.463
13
14
15    ------------------
16    TABLE "A"
17    ------------------
18            1       NA
19            2        6
20    ------------------
21    TABLE "B"
22    ------------------
23            1        1
24            4        2
25            5        1
26    ------------------
27    MACHINE TABLE # 1
28    ------------------
29            1        1
30            2        2
31            3        3
32            4       NA
33            5        7
34    ------------------
35    MACHINE TABLE # 2
36    ------------------
37            0        4
38           20        5
39           25        6
40    ------------------        ------------------        ------------------        ------------------
41    MACHINE   HOURLY          MACHINE PRODUCTION        MAT'L    GRADE            PERCENT  OF COST
42    COST     TABLE            RATE TABLE                COST/SQFT TABLE           MARKUP   TABLE
43    MACHINE # PRICE/HR        MACHINE #  SQFT/HR        ------------------        ------------------
44    ------------------        ------------------              100     9.55              0      2.5
45            1    25.55                1       36              150     6.35            100     2.25
46            2    30.55                2       25              200     5.63            200        2
47            3    20.75                3       45              250     7.88            250     1.75
48            4    41.75                4       12              300     6.75            300     1.55
49            5    56.95                5       69                                      500     1.25
50            6    18.95                6       78
51            7   125.25                7       95
52    ------------------        ------------------
```

Figure 3

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE SIX

CHECKBOOK LEDGER

DESCRIPTION

The VisiCalc ability to store selected values onto disk storage and reenter them on a worksheet for accumulating is employed in this exercise. Ledger posting, with the ability to accumulate the postings and add or subtract the resulting value from a balance figure is demonstrated. A method for displaying a zero value in a column prior to ledger entry is featured.

To demonstrate Visicalc's abilities, a Checkbook Ledger been designed. Deposit and payment entries are made in the checkbook, and the resulting checkbook balance and the totals of all the columns containing entries are automatically calculated. On a monthly schedule, the year to date total is transferred to a disk file for later reentry and repositioning as a cumulative total on the following month's worksheet.

OPERATIONS PERFORMED

Setting Up The Format

Entering Mathematical Formulas

Posting Entries

Monthly Updating

Making Additional Entries

Saving

Printing

FUNCTIONS USED

SUM
MIN

COMMANDS USED

REPEAT LABEL	
FORMAT	R = justifies right
GLOBAL	$ = dollar and cents format
STORAGE	saves
STORAGE	# = saves a Data Interchange Format file
REPLICATE	copies
INSERT	R = row

SETTING UP THE FORMAT

To set up your checkbook, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

```
     A       B       C       D       E       F       G       H       I       J       K       L       M

 1  LAST MONTHS YTD TOTAL :::::
 2  ---------------------------------------------------------------------------------------------------
 3      DATE  CHECK #  PAID TO  DEPOSIT   CHECK   CH.BOOK  SAVINGS  CASH ON    RENT    PHONE SUPPLIES  MISC.   PURCHASE
 4                                        AMOUNT  BALANCE           HAND
 5  ---------------------------------------------------------------------------------------------------
 6
 7
 8
 9
10
11
12
13
14  ===================================================================================================
15  CURRENT  MONTHS   TOTALS ::
16  NEW YEAR TO DATE TOTAL ::::
```

Figure 1

To format all locations to display value entries in dollars and cents, type:

/G	starts GLOBAL command
F	FORMAT
$	dollars and cents

To enter your column headings, type:

/F	starts FORMAT command
R	justifies right

Type in your column title. Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column title into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your checkbook, place your cursor on the left-most column of the row where you want the line (line A2 in this example).

Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns,

Type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B2	the first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
M2	the last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the checkbook, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their positions are illustrated in Figure 2.

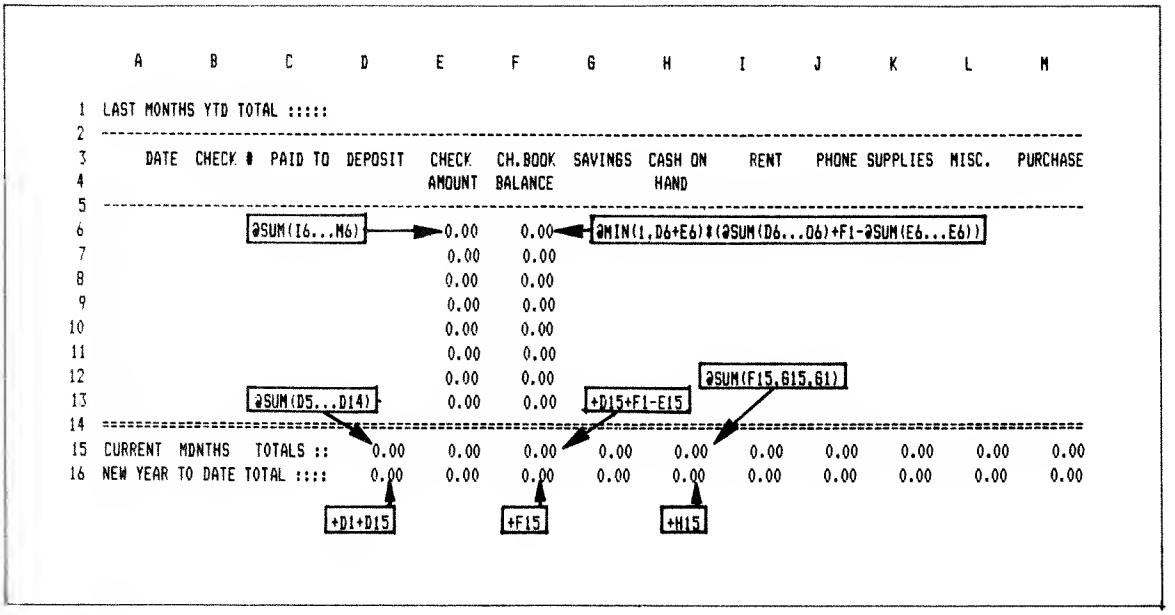

Figure 2

Your first formula will add the total of the postings from the RENT column across to the PURCHASE column.

Place your cursor on E6 and type:

@SUM(	adds values in the list
I6	first coordinate of the row you wish to add
.	ellipsis ... indicates from-to
M6)	last coordinate of the row you wish to add
RETURN	enters the formula

Your second formula determines the CH. BOOK BALANCE. The MIN function is used to select the lesser of the values, one, or the total of the DEPOSIT and CHECK AMOUNT for the CH. BOOK BALANCE. The resulting value is multiplied by the total of the DEPOSITS, LAST MONTH'S YTD TOTAL for the CH. BOOK BALANCE minus the CHECK AMOUNTS to date for the month.

Place your cursor on F6 and type:

@MIN(1,D6+E6)	selects the minimum value, 1 or the total of D6 and E6
*	multiplies
(	parenthesis-separates values within the formula
@SUM(	adds values in the list
D6	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to
D6)	last coordinate of the column that you wish to add
+	adds
F1	coordinate containing value
-	subtracts
@SUM(	adds values in the list
E6	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to
E6))	last coordinate of the column that you wish to add
RETURN	enters the formula

Now copy the formulas in the CHECK AMOUNT and CH. BOOK BALANCE columns down the columns in each row to the double-dashed line.

Place your cursor on E6 and type:

/R	starts REPLICATE command
F6	copies all entries across columns E6 to F6
RETURN	prepares to receive additional information
E7	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to

E13	last coordinate where you wish to copy the formulas down columns
RETURN	executes the command and prepares to receive additional instructions
R R R R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change
R N N R	

Next, enter the formula to add the CURRENT MONTH'S TOTAL in the DEPOSIT column.

Place your cursor on D15 and type:

@SUM(	adds values in the list
D5	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to
D14)	last coordinate of the column that you wish to add
RETURN	enters the formula

Your next formula will add the LAST MONTH'S YTD TOTAL in the DEPOSIT column to the CURRENT MONTH'S TOTAL in that same column to provide the NEW YEAR TO DATE TOTAL.

Place your cursor on D16 and type:

+	prepares coordinate to accept a numeric expression
D1	coordinate containing value
+	adds
D15	coordinate containing value
RETURN	enters the formula

Now, copy the two formulas you just entered across under the remaining columns to the right on your worksheet.

Place your cursor on D15 and type:

/R	starts REPLICATE command
D16	copies all entries down columns D15 to D16
RETURN	prepares to receive additional information
E15	first coordinate where you wish to copy the formulas across columns
.	ellipsis ... indicating from-to
M15	last coordinate where you wish to copy the formulas across columns
RETURN	executes the command and prepares to receive additional instructions
R R R R	tells the command to copy the coordinate address in the formula relative to its new location

The CH. BOOK BALANCE and CASH ON HAND columns use special formulas to obtain totals on their CURRENT MONTH TOTAL and NEW YEAR TO DATE TOTAL lines. For this reason, you will now replace the formulas in those locations.

Place your cursor on F15 and type:

+	prepares coordinate to accept a numeric expression
D15	coordinate containing value
+	adds
F1	coordinate containing value
-	subtracts
E15	coordinate containing value
RETURN	enters the formula

Place your cursor on F16 and type:

+	prepares coordinate to accept a numeric expression
F15	coordinate containing value
RETURN	enters the formula

Place your cursor on H15 and type:

@SUM(	adds values in the following list
F15	coordinate containing value in the list
,	comma-separates values in the list
G15	coordinate containing value in the list
,	comma-separates values in the list
G1)	coordinate containing value in the list
RETURN	enters the formula

Place your cursor on H16 and type:

+	prepares coordinate to accept a numeric expression
H15	coordinate containing value
RETURN	enters the formula

Your blank checkbook worksheet is now complete, containing all the formulas necessary for its operation. Prior to posting entries, save the entire worksheet by transferring it to a disk file for later use.

Now save the worksheet to disk storage.

Type:

/S	starts STORAGE command
S	saves
CHECKBOOK	name of file; do not type spaces between words
RETURN	executes the command

POSTING ENTRIES

You may now begin posting entries in your checkbook worksheet to observe its operation. Sample entries are shown in Figure 3. You may use them, if you wish, to check the operation of your worksheet against the illustration.

NOTES

To enter check numbers as labels, depress the quotation mark (") key prior to the entry, which prepares the coordinate to accept a label expression.

Never enter values in coordinates containing formulas, or the formulas will be erased.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LAST MONTHS YTD TOTAL :::::												
2													
3	DATE	CHECK #	PAID TO	DEPOSIT	CHECK AMOUNT	CH.BOOK BALANCE	SAVINGS	CASH ON HAND	RENT	PHONE	SUPPLIES	MISC.	PURCHASE
4													
5													
6	JUN 2,81			15000.00	0.00	15000.00	1200.00						
7	JUN 25	101	RENTALS		550.00	14450.00			550.00				
8	JUN 25	102	NW BELL		250.00	14200.00				250.00			
9	JUN 30	103	ACME		125.00	14075.00					125.00		
10	JUN30	104	HARDWARE		4500.00	9575.00							4500.00
11					0.00	0.00							
12					0.00	0.00							
13					0.00	0.00							
14													
15	CURRENT MONTHS TOTALS ::			15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00
16	NEW YEAR TO DATE TOTAL ::::			15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00

Figure 3

MONTHLY UPDATING

To perform the updating process, you will transfer the values in the NEW YEAR TO DATE TOTAL row to a disk storage file. You will later reenter these values into a worksheet for the new month by recalling them from the file.

NOTE

Prior to performing the monthly update, be sure you make arrangements, if desired, for permanent storage of the current worksheet before erasing it from the computer memory.

Place your cursor on D16 (the left-most coordinate of the row you wish to copy into the storage file).

Type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
CHBK.TOTALS	name of file; do not type spaces between words
RETURN	prepares to receive additional information
M16	right-most coordinate of the row of value entries to be saved
RETURN	prepares to receive additional instructions
R	saves the values in row form and executes the command

When your arrangements for permanent storage of your current worksheet are complete, your next step is to clear the computer memory.

To clear the computer memory, type:

/C	starts CLEAR command
Y	activates CLEAR command

Next, load your blank checkbook worksheet, saved in a previous operation, from your disk storage file.

To load your blank checkbook worksheet, type:

/S	starts STORAGE command
L	loads

CHECKBOOK	name of file; do not type spaces between words
RETURN	executes the command

Now, load the NEW YEAR TO DATE TOTAL values saved from the old checkbook worksheet into the LAST MONTH'S YTD TOTAL row on the new worksheet.

Place your cursor on D1 (the left-most coordinate of the row where you wish the values to be reentered)

Type:

/S	starts STORAGE command
#	loads a (DIF) Data Interchange Format file
L	loads
CHBK. TOTALS	name of file; do not type spaces between words
RETURN	prepares to receive additional instructions
R	loads the values in row form and executes the command

You have now completed your monthly update and have entered the cumulative totals in your next checkbook worksheet, as illustrated in Figure 4. You are ready to begin posting entries for the new month.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LAST MONTHS YTD TOTAL :::::			15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00
2	---												
3		DATE	CHECK #	PAID TO	DEPOSIT	CHECK	CH.BOOK	SAVINGS	CASH ON	RENT	PHONE	SUPPLIES	MISC.	PURCHASE
4						AMOUNT	BALANCE		HAND				
5	---												
6						0.00	0.00						
7						0.00	0.00						
8						0.00	0.00						
9						0.00	0.00						
10						0.00	0.00						
11						0.00	0.00						
12						0.00	0.00						
13						0.00	0.00						
14	==========												
15	CURRENT MONTHS TOTALS ::			0.00	0.00	9575.00	0.00	10775.00	0.00	0.00	0.00	0.00	0.00
16	NEW YEAR TO DATE TOTAL ::::			15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00

Figure 4

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded, however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE COMMAND.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	starts INSERT command
R	inserts row and executes the command

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper left coordinate of the worksheet area rectangle you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower right-hand coordinate address of the worksheet area rectangle you wish to print and type:

RETURN	executes the command

EXERCISE SEVEN

ENGINEERING FORMULA

DESCRIPTION

VisiCalc presents an excellent tool for working complex calculations with relative ease when compared to using individual calculator operations for each step. In this exercise, you will modify a mathematical formula to VisiCalc entry format. You will then enter the formula and exercise the computations by changing the formula parameters.

To demonstrate VisiCalc's ability, an engineering formula was selected to demonstrate mathematical calculation entry and operation, and was taken from an engineering handbook. Conversion of the formula to a form that can be entered into the VisiCalc worksheet is illustrated. Identifying and labeling variable parameter locations, and entry and exercise of the formula, is demonstrated.

OPERATIONS PERFORMED

Converting Mathematical Formulas to VisiCalc Entry Format

Identifying and Labeling Variable Parameter Locations

Entering a Mathematical Formula

Entering Calculation Values

FUNCTIONS USED

COS

SQRT

^ to the power of

Figure 1 illustrates the mathematical formula used in this exercise, along with identification of the parameters used.

Resultant force (**R**) of two forces, $\mathbf{F_1}$ and $\mathbf{F_2}$, which make an angle α with each other, the angle between the resultant force **R** and the force $\mathbf{F_1}$ being θ.

$$R = \sqrt{F_1^2 + F_2^2 + 2\,F_1F_2 \cos \alpha}.$$

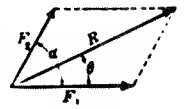

FIG. 495.

Figure 1

Your first operation is to prepare the formula for conversion to a form that can be entered into the VisiCalc worksheet. To do this, write the calculating operations in sequential form, substituting VisiCalc functions where appropriate. The modified mathematical formula is illustrated in Figure 2.

NOTE

The SIN, COS and TAN functions are calculated internally by VisiCalc in radians. To obtain the natural SIN, COS and TAN values from SIN, COS and TAN calculations in VisiCalc, it is necessary to divide by the conversion factor 57.30. The example in this section using the COS function is illustrated with this conversion factor added as a part of the operation.

```
R = @SQRT(((F1^2)+(F2^2))+(2*F1*F2*(@COS(a/57.30))))
```

Figure 2

Now, select locations where you will enter the formula parameter values on your worksheet and type in an identifying label in the column to the left of each one.

In this example, the label for parameter (F1) will be located in coordinate A1, and the value will be in coordinate B1.

The label for parameter (F2) will be located in coordinate A2, and the value will be in coordinate B2.

The label for (a) will be located in coordinate A3, and the value will be in coordinate B3.

The label for (R) will be located in coordinate A4. The formula for (R) will be entered in coordinate B4.

Your next operation is to type in the identifying labels for your parameter values, as illustrated in Figure 3.

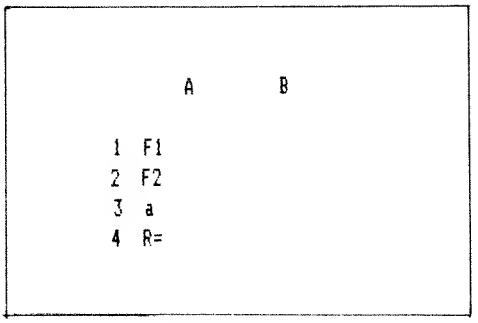

Figure 3

Place your cursor on A1 and type:

F1	label for parameter F1

Place your cursor on A2 and type:

F2	label for parameter F2

Place your cursor on A3 and type:

a	label for parameter a

Place your cursor on A4 and type:

R=	label for parameter R

Now, enter your formula to calculate (R) in B4.

Place your cursor on B4 and type:

@SQRT(	calculates the square root of the following value
(	parenthesis-separates calculations in the formula
(B1	coordinate where (F1) value is located
^	tells the computer to take the previous value to the power indicated
2)	power
+	adds

(B2	coordinate containing (F2) value
^	tells the computer to take the previous value to the power indicated
2))	power
+	adds
(2	value
*	multiplies
B1	coordinate containing (F1) value
*	multiplies
B2	coordinate containing (F2) value
*	multiplies
(@COS(	cosine
B3	coordinate containing (a) value
/	divides
57.3	divisor-factor for converting to natural cosine value
))))	parentheses-encloses calculations within formula
RETURN	enters formula

Your formula is now entered on your worksheet and ready to use. To exercise your formula, type in the sample entries illustrated in Figure 4. By changing the input parameters, you can continually recalculate the value of (R).

	A	B
1	F1	5
2	F2	5
3	a	25
4	R=	9.762995

Figure 4

EXERCISE EIGHT

ACCOUNTS PAYABLE

DESCRIPTION

Visicalc has the ability to provide automatic calculation of columns and rows when new entries are inserted.

To demonstrate VisiCalc's ability, a monthly ACCOUNTS PAYABLE worksheet has been set up. Updating functions are performed as necessary. The accumulated totals of each column are automatically calculated and displayed at the bottom of each column. The updating of an entry in any column or row will update the entire column or row.

OPERATIONS PERFORMED

Setting Up The Worksheet Format

Entering Mathematical Formulas

Making Worksheet Entries

Making Additional Worksheet Entries

Saving

Printing

FUNCTIONS USED

LOOKUP
SUM
IF

COMMANDS USED

REPEAT LABEL	
FORMAT	$ = dollars and cents
FORMAT	R = justifies right
REPLICATE	copies
STORAGE	saves
PRINT	
GLOBAL	manual recalculate

SETTING UP THE WORKSHEET FORMAT

To set up and label the exercise format on your worksheet, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

```
      A       B       C       D       E       F       G       H       I       J       K       L       M         O

 1                          INVOICE  DATE                    DATE PAYABLE TO GET DISCOUNT       INTEREST
 2                 -------------------------                -------------------------                   COST OF DISCOUNT
 3   ACCOUNT   TOTAL   MONTH   DAY     YEAR DISCOUNT DAYS FOR   MONTH     DAY     YEAR DISCOUNT     NET BORROWED   VS
 4     NAME   AMOUNT                        PERCENT DISCOUNT                          AMOUNT  PAYABLE   MONEY   BORROW
 5 ---------------------------------------------------------------------------------------------------------------------
 6
 7
 8
 9
10
11
12 =====================================================================================================================
13 TOTAL
14
15
16 TABLE FOR DAYS IN MONTHS
17 --------------------------
18       0       1       2       3       4       5       6       7       8       9      10      11      12
19       0      31      28      31      30      31      30      31      31      30      31      30      31
```

Figure 1

VisiCalc automatically calculates the worksheet. However, due to the size of the calculations in this exercise, you may want to manually calculate the worksheet after making your entries.

To set up the worksheet for manual calculation, type:

/G	starts GLOBAL command
R	recalculates
M	manual

To enter your column labels, place your cursor on the location where you want to make your entry. (VisiCalc automatically left justifies the label.) To right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type in the column label.

Depressing the cursor (directional) key enters the label into the location and allows the cursor to be advanced to the next location.

NOTE

> When entering a label that contains more characters than the width of the column allows, you must move the cursor to the next adjacent column and continue typing the label. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your ledger sheet, place your cursor on the column and row where you want your dashed line to start(coordinate C2 in Figure 1). Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column your cursor is on will now have a dashed line across its width. To extend the dashed line in the same row, across other columns, leave your cursor on C2 and type:

/R	starts REPLICATE COMMAND
RETURN	tells the command to copy the dashed line your cursor is on
D2	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating to-from
E2	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line on your worksheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row positions. The formulas and their positions are illustrated in Figure 2.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1				INVOICE DATE				DATE PAYABLE TO GET DISCOUNT				INTEREST	18	
2													COST OF DISCOUNT	
3	ACCOUNT	TOTAL	MONTH	DAY	YEAR	DISCOUNT DAYS FOR		MONTH	DAY	YEAR	DISCOUNT	NET BORROWED	VS	
4	NAME	AMOUNT				PERCENT DISCOUNT					AMOUNT	PAYABLE	MONEY	BORROW
5														
6	@IF(D6+G6<=@LOOKUP(C6,A18...M18),C6,@IF(C6+1=13,1,C6+1))							0	0	0	0.00	0.00	0.00	0.00 ← +K6-M6
7	@IF(D6+G6<=@LOOKUP(C6,A18...M18),D6+G6,D6+G6-@LOOKUP(C6,A18...M18))							0	0	0	0.00	0.00	0.00	0.00
8	@IF(D6+G6<=@LOOKUP(C6,A18...M18),E6,@IF(C6+1=13,E6+1,E6))							0	0	0	0.00	0.00	0.00	0.00
9	+B6*F6/100							0	0	0	0.00	0.00	0.00	0.00
10	+B6-K6							0	0	0	0.00	0.00	0.00	0.00
11	+M1/100/365*(@LOOKUP(H6,A18...M18)-I6)*L6							0	0	0	0.00	0.00	0.00	0.00
12														
13	TOTAL	0.00									0.00	0.00	0.00	0.00
14	@SUM(B5...B12)													
15														
16	TABLE FOR DAYS IN MONTHS													
17														
18	0	1	2	3	4	5	6	7	8	9	10	11	12	
19	0	31	28	31	30	31	30	31	31	30	31	30	31	

Figure 2

Formula number one, in the MONTH column of the DATE PAYABLE TO GET DISCOUNT column, utilizes IF logic function and LOOKUP function to determine the month in which the payment must be paid to enable you to take the discount.

NOTE

> IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression. In the following formula, the value of the third expression is generated by the use of a second IF function.

Place your cursor on H6 and type:

@IF(	starts IF logic function
D6+G6	part of the first expression, which generates the first value to be compared

<=	LOGICAL OPERATORS, compare the first value against the second value, and result in the logical value of true or false
@LOOKUP(	starts LOOKUP function, which generates the second value to be compared
C6	coordinate containing value to look up
,	comma-separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
M18	last coordinate in the reference table
)	closes LOOKUP function
,	comma-separates expressions in the formula
C6	second expression in IF function, which is selected if the first expression is true
,	comma-separates expressions in the formula
@IF(	starts the second IF logic function, which generates the value for the third expression, which is selected if the first expression is false
C6+1	part of the first expression in the second IF function, which generates the first value to be compared
=	LOGICAL OPERATOR, compares the first value against the second value and results in the logical value of true or false
I3	second value to be compared
,	comma-separates expressions in the formula
1	second expression in the second IF function, which is selected if the first expression is true
,	comma-separates expressions in the formula

C6+1	third expression in the second IF function, which is selected if the first expression is false
)	closes second IF logic function
)	closes first IF logic function
RETURN	enters the formula

Formula number two, in the DAY column, of the DATE PAYABLE TO GET DISCOUNT column, utilizes IF logic function and LOOKUP function to determine the day that the payable must be paid to allow you to take the discount.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression If the value is false, the IF selects the value generated by the third expression.

Place your cursor on I6 and type:

@IF(	starts IF logic function
D6+G6	part of the first expression, which generates the first value to be compared
<=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false
@LOOKUP(	starts LOOKUP function, which generates the second value to be compared
C6	coordinate containing value to look up
,	comma-separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
M18	last coordinate in the reference table
)	closes LOOKUP function

,	comma-separates expressions in the formula
D6+G6	second expression in the IF function, which is selected if the first expression is true
,	comma-separates expressions in the formula
D6+G6	beginning of the third expression, which generates part of the value of the third expression which will be selected if the first expression is false
-	subtracts
@LOOKUP(	starts LOOKUP function, which generates the value to be subtracted in the third expression
C6	coordinate containing value to look up
,	comma-separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
M18	last coordinate in the reference table
)	closes LOOKUP function
)	closes the formula
RETURN	enters the formula

Formula number three, in the YEAR column, of the DATE PAYABLE TO GET DISCOUNT column, utilizes IF logic function and LOOKUP function, to determine the year in which the payable must be paid to allow you to take the discount.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

In the following formula, the value of the third expression is generated by the use of a second IF function.

Place your cursor on J6 and type:

@IF(	starts IF logic function
D6+G6	part of the first expression, which generates the first value to be compared
<=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false
@LOOKUP(	starts LOOKUP function, which generates the second value to be compared
C6	coordinate containing value to LOOKUP
,	comma-separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
M18	last coordinate in the reference table
)	closes LOOKUP function
,	comma-separates expressions in the formula
E6	second expression in the IF function, which is selected if the first expression is true
,	comma-separates expressions in the formula

@IF(	starts the second IF logic function, which generates the value for the third expression, which is selected if the first expression is false
C6+1	part of the first expression in the second IF function, which generates the first value to be compared
=	LOGICAL OPERATOR, compares the first value against the second value and results in the logical value of true or false
13	second value to be compared
,	comma-separates expressions in the formula
E6+1	second expression in the second IF function, which is selected if the first expression is true
,	comma-separates expressions in the formula
E6	third expression in the second IF function, which is selected if the first expression is false
)	closes second IF logic function
)	closes first IF logic function
RETURN	enters the formula

Formula number four, in the DISCOUNT AMOUNT column, calculates the discount amount, and displays it in dollars and cents.

Place your cursor on K6 and type:

+	prepares coordinate to accept a numeric expression.
B6	coordinate containing value
*	multiplies
F6	coordinate containing value
/	divides
100	value
RETURN	enters the formula

/F	starts FORMAT command
$	displays in dollars and cents

Formula number five, in the NET PAYABLE column, calculates the net payable amount and displays it in dollars and cents.

Place your cursor on coordinate L6 and type:

+	prepares coordinate to accept a numeric expression
B6	coordinate containing value
-	subtracts
K6	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

To enter the bank interest which will be used in the following formula,

Place your cursor on coordinate M1 and type:

18	value
RETURN	enters the value

Formula number six, in the COST OF BORROWED MONEY column, makes the following assumptions: That all bills are received on the first day of the month and are due on the last day of the month; that all discounted bills are paid on the date payable to get discount; that the money to pay the discounted bills does not come from cash flow, but is borrowed from the bank on the date payable to get discount, and is paid back on the last day of the month.

This formula calculates the cost of borrowing the money from the date payable to get discount through the last day of the month.

Place your cursor on M6 and type:

+	prepares coordinate to accept a numeric expression
M1	coordinate containing value (bank interest rate)

/	divides
100	value, to reduce the value generated to a percentage
/	divides
365	value, to reduce the bank interest rate to a percent per day value
*	multiplies
(@LOOKUP(	starts LOOKUP function, which generates the value to be multiplied
H6	coordinate containing value to look up
,	comma-separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
M18	last coordinate in the reference table
)	closes LOOKUP function
-	subtracts
I6	coordinate containing value
)	closes subtraction function from LOOKUP
*	multiplies result generated
L6	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Formula number seven, the DISCOUNT VS BORROW column, subtracts the cost of the borrowed money from the amount of discount received. This enables you to see whether you have actually gained or lost money by borrowing the money necessary to pay the bills and take the discount.

Place your cursor on N6 and type:

+	prepares coordinate to accept a numeric expression
K6	coordinate containing value
-	subtracts
M6	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Your next operation is to copy, using REPLICATE command, the formulas just entered at the top of each column into each row in the respective columns.

Place your cursor on H6 and type:

/R	starts REPLICATE command
N6	copies all entries across columns H6 to N6
RETURN	prepares to receive additional information
H7	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to
H11	last coordinate where you wish to copy the formulas down columns
RETURN	executes the command and prepares to receive additional instructions

R tells the command to copy the
R coordinate address in the formula
R relative to its new location

N tells the command to copy the
N coordinate address in the formula
in its new location without change

R
R
R
R
R
R
N
N
R
R
R
R
R
N
N
R
R
R
N
N
R
R
R
R
R
R
R
R
N
R
N
N
R
R
R
R

Formula number eight, in the TOTAL AMOUNT column, calculates the total amount of payables to be paid, prior to any discounts being taken.

Place your cursor on B13 and type:

@SUM(adds values in the list

B5 first coordinate in the list

.	ellipsis ... indicating from-to
B12	last coordinate in the list
)	closes the list
RETURN	enters the formla
/F	starts FORMAT command
$	displays in dollars and cents

Your next operation is to copy, using REPLICATE command, the formula just entered into the respective row at the bottom of each appropriate column.

Place your cursor on B13 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in B13
K13	first coordinte where you wish to copy the formula across columns
.	ellipsis...indicating from-to
N13	last coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

MAKING WORKSHEET ENTRIES

Enter worksheet entries exactly as illustrated in Figure 3, retaining exact row and columnn locations of all information.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1			INVOICE DATE					DATE PAYABLE TO GET DISCOUNT				INTEREST	18	
2													COST OF DISCOUNT	
3	ACCOUNT	TOTAL	MONTH	DAY	YEAR	DISCOUNT	DAYS FOR	MONTH	DAY	YEAR	DISCOUNT	NET	BORROWED	VS
4	NAME	AMOUNT				PERCENT	DISCOUNT				AMOUNT	PAYABLE	MONEY	BORROW
5														
6	TYLER	500	6	2	82	1	10	6	12	82	5.00	495.00	**4.39**	**0.61**
7	TIFFANY	900	6	12	82	1.5	15	6	27	82	13.50	886.50	**1.31**	**12.19**
8	KAREN	1500	12	25	82	1.25	10	1	4	83	18.75	1481.25	**19.72**	**-0.97**
9								0	0	0	0.00	0.00	0.00	0.00
10								0	0	0	0.00	0.00	0.00	0.00
11								0	0	0	0.00	0.00	0.00	0.00
12														
13	TOTAL	2900.00									37.25	2862.75	**25.42**	**11.83**
14														
15														
16	TABLE FOR DAYS IN MONTHS													
17														
18	0	1	2	3	4	5	6	7	8	9	10	11	12	
19	0	31	28	31	30	31	30	31	31	30	31	30	31	

Figure 3

After the entries have been made, you will want to do a manual recalculation to calculate the entire sheet at one time.

To perform this function, depress the following key:

! manual recalculation

MAKING ADDITIONAL WORKSHEET ENTRIES

To make additional worksheet entries after you have manually recalculated, simply complete the following operations:

Place your cursor on the coordinate whose value you wish to change, and type the new value for that coordinate. Then type:

! manual recalculation

SAVING

In some instances you may wish to store your work format or completed work on a disk file for later retrieval.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
FILENAME	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle that you wish to print and type:

/P	starts PRINT command
P	printer

Type in the lower-right coordinate of the worksheet area rectangle that you wish to print and press:

RETURN	executes the command

EXERCISE NINE

PAYROLL REPORTING

DESCRIPTION

VisiCalc has the ability to allow the updating, storage, retrieval and use of multiple worksheets. VisiCalc allows you to draw information from one worksheet, and insert it into another worksheet, for updating and accumulating purposes.

To demonstrate VisiCalc's ability, Exercise Nine consists of two worksheets, a MONTHLY PAYROLL worksheet and a QUARTERLY PAYROLL worksheet. Information for the QUARTERLY PAYROLL worksheet is updated from the MONTHLY PAYROLL worksheet, allowing you to keep updated quarterly year to date totals, and the MONTHLY PAYROLL worksheet to receive YTD totals from the QUARTERLY PAYROLL worksheet.

OPERATIONS PERFORMED

Setting Up The Worksheet

Entering Mathematical Formulas

Making Worksheet Entries

Making Ledger Entries to Worksheet

Saving Worksheet

Loading Worksheet

Printing

FUNCTIONS USED

LOOKUP
SUM
MAX
MIN

COMMANDS USED

REPEAT LABEL	
CLEAR	
FORMAT	$ = dollars and cents
FORMAT	R = justifies right
REPLICATE	copies
STORAGE	# saves a (DIF) Data Interchange Format file
STORAGE	# loads a (DIF) Data Interchange Format file
PRINT	

SETTING UP THE WORKSHEET FORMAT

The first worksheet that you will set up and label is the MONTHLY PAYROLL WORKSHEET. To do this, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

```
              A       B       C       D       E       F       G       H       I       J       K

1       EMPLOYEE  HOURLY    REG.      OT      DT   GROSS    MISC     FED    FICA     NET     YTD
2          NAME    RATE   HOURS   HOURS   HOURS     PAY     W/H     W/H            PAY   GROSS
3      ------------------------------------------------------------------------------------------
4
5
6
7
8
9
10
11
12     ==========================================================================================
13
14
15
16     FED W/H TABLE
17     ---------------------------------------------------
18           0     100     200     300     400     500
19        .005     .01    .015     .02    .025     .03
```

Figure 1

To enter your column labels, place your cursor on the location where you want to make your entry. VisiCalc automatically left justifies the label; to right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type the column label.

Depressing the cursor (directional) key enters the label into the location and allows the cursor to be advanced to the next location.

NOTE

When entering a label that contains more characters than the width of the column allows, you must move the cursor to the next adjacent column and continue typing the label.

Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your worksheet, place your cursor on the column and row where you want your dashed line to start (coordinate A3 in Figure 1). Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column that your cursor is on will now have a dashed line across its width. To extend the dashed line in the same row, across other columns, leave your cursor where it is and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B3	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
K3	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line on your worksheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row positions. The formulas and their positions are illustrated in Figure 2.

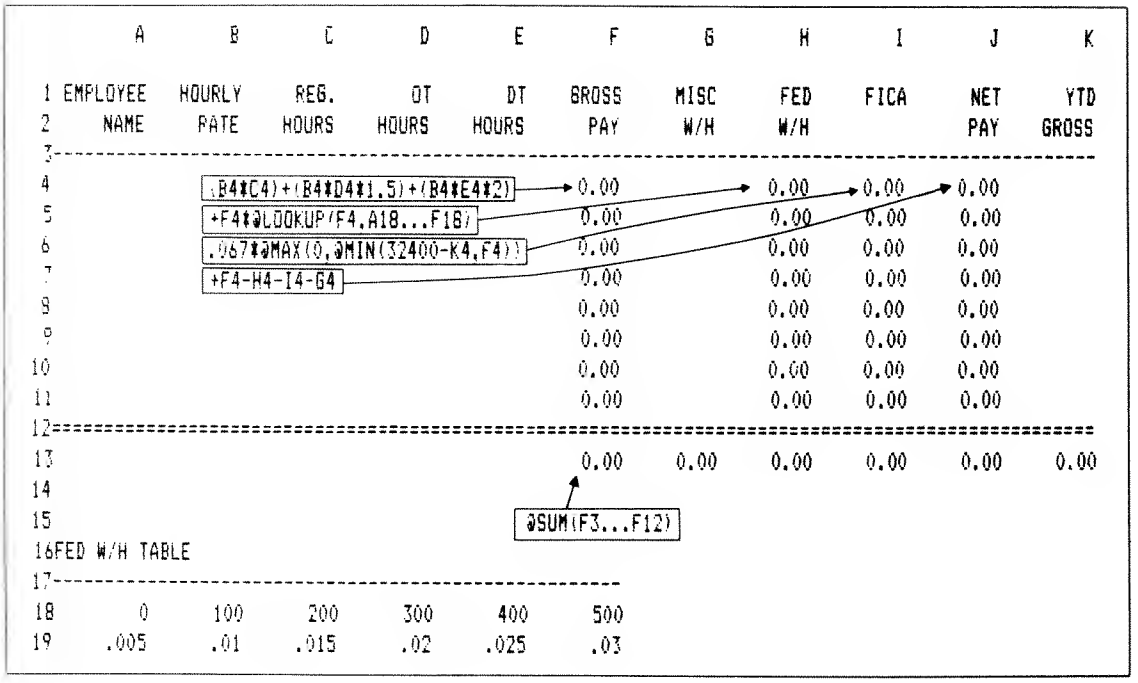

Figure 2

Formula number one, in the GROSS PAY column, figures total gross pay by first taking the total number of regular hours worked, and multiplying that times the hourly rate. It then takes the number of overtime hours worked and multiplies that one and one-half times the hourly rate. It then takes the number of double time hours worked and multiplies the total by two times the hourly rate. It adds the three totals and displays the total amount in the GROSS PAY column.

Place your cursor on F4 and type:

(	starts first expression
B4	coordinate containing value
*	multiplies
C4	coordinate containing value
)	closes first expression
+	adds
(	opens second expression
B4	coordinate containing value
*	multiplies

D4	coordinate containing value
*	multiplies
1.5	value
)	closes second expression
+	adds
(	opens third expression
B4	coordinate containing value
*	multiplies
E4	coordinate containing value
*	multiplies
2	value
)	closes third expression and formula
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Formula number two, in the FED W/H column, takes the amount of gross pay and multiplies it times a value generated by a LOOKUP of the FED W/H table. With these operations, formula number two calculates the correct amount of money payable to FED W/H and displays that amount in dollars and cents.

NOTE

The table shown is for demonstration purposes only. It is not meant to be used for actual calculation of your FED W/H.

Place your cursor on H4 and type:

+	prepares coordinate to accept a numeric expression
F4	coordinate containing value
*	multiplies
@LOOKUP(	starts LOOKUP function, which generates the second value to be multiplied

F4	coordinate containing value to look up
,	comma, separates LOOKUP value from the reference table
A18	first coordinate in the reference table
.	ellipsis ... indicating from-to
F18	last coordinate in the reference table
)	closes LOOKUP function
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Formula number three, in the FICA column, calculates the amount of money to be paid to FICA, up to a gross pay amount of $32,400. It then displays the amount payable, in dollars and cents. This formula uses a MAX function to select a fixed value, or the value generated from a list by the MIN function.

Place your cursor on I4 and type:

.067	value to multiply by
*	multiplies
@MAX	selects the maximum value of the following list
(	opens the list
0	value in the list
,	comma-separates values in the list
@MIN	selects the minimum value of the following list, which will generate the second value in the first list
(	opens the second list
32400	value
-	subtracts

K4	coordinate containing value
,	comma-separates values in the list
F4	coordinate containing value in the second list
)	closes the second list
)	closes the first list
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Formula number four, in the NET PAY column, subtracts the amounts in the FED W/H, FICA, and MISC. W/H columns from the GROSS PAY amount to arrive at a NET PAY figure. It then displays that figure in dollars and cents.

Place your cursor on J4 and type:

+	prepares coordinate to accept a numeric expression
F4	coordinate containing value
-	subtracts
H4	coordinate containing value
-	subtracts
I4	coordinate containing value
-	subtracts
G4	coordinate containing value
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Your next operation is to copy, using REPLICATE command, the formulas that you just entered, in the appropriate rows and columns on the worksheet.

Place your cursor on F4 and type:

/R	starts REPLICATE command
J4	copies all entries across columns, F4 through J4
RETURN	prepares to receive additional information
F5	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to
F11	last coordinate where you wish to copy the formulas down columns
RETURN	executes the command and prepares to receive additional instructions
R R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location
N N	tells the command to copy the coordinate address in the formula in its new location without change
R R R R R R	

Formula number five, in the GROSS PAY column, calculates the total of the GROSS PAY at the bottom of the column and displays that amount in dollars and cents.

Place your cursor on F13 and type:

@SUM(	adds values in the list
F3	first coordinate of the column that you wish to add
.	ellipsis ... indicating from-to

F12)	last coordinate of the column that you wish to add
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Your next operation is to copy, using REPLICATE command, the formula just entered in the GROSS PAY column, into the row at the bottom of each appropriate column.

Place your cursor on F13 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in F13
G13	first coordinate where you wish to copy the formula across columns
.	ellipsis ... indicating from-to
K13	last coordinate where you wish to copy the formula across columns
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location.

SAVING

Now that the monthly worksheet is completed, you will need to save it on a disk for later use.

To save the entire worksheet type:

/S	starts STORAGE command
S	saves
MONTHLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle that you wish to print, coordinate A1, and type:

/P	starts PRINT command
P	printer
K19	the lower-right coordinate of the worksheet area rectangle that you wish to print
RETURN	executes the command

Now that your worksheet formatting is complete, you may wish to print the formulas for later use.

To print the formulas, type:

/S	starts STORAGE command
S	saves
.PRINTER	prints the file
RETURN	executes the command

SETTING UP THE WORKSHEET FORMAT

Prior to setting up a second worksheet, you must be sure that you have cleared memory. To do this, type:

/C	starts CLEAR command
Y	yes, clears memory and executes the command

The second worksheet that you will set up and label is the QUARTERLY PAYROLL REPORT worksheet. Copy Figure 3 exactly as it is illustrated, retaining exact row and column locations of all information.

For the purpose of demonstration, we are only going to use two months in the quarter.

```
     A       B       C       D       E       F       G       H       I       J       K       L       M

1          QUARTERLY PAYROLL REPORT
2          -------------------------
3  FIRST MONTH                      SECOND MONTH                     YEAR TO DATE
4  ---------------------------------------------------------------------------------------------------
5     GROSS    MISC     FED    FICA   GROSS    MISC     FED    FICA   GROSS    MISC     FED    FICA   TOTAL
6      PAY     W/H      W/H            PAY     W/H      W/H            PAY     W/H      W/H            FICA
7  ---------------------------------------------------------------------------------------------------
8
9
10
11
12
13
14
15
16 ===================================================================================================
```

Figure 3

Figure 3

To format all coordinates to display value entries in dollars and cents, type:

/G	starts GLOBAL command
F	FORMAT
$	dollars and cents

To enter your column labels, place your cursor on the location where you want to make your entry. (VisiCalc automatically left justifies the label.) To right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type the column label.

Depressing the cursor (directional) key enters the label into the location and allows the cursor to be advanced to the next location.

NOTE

When entering a label that contains more characters than the width of the column allows, you must move the cursor to the next adjacent column and continue typing the label.

Type in the rest of your column headings, using the sequence of commands above.

To enter dashed lines on your worksheet, move your cursor to the column and row where you want your dashed line to start (coordinate B2 in Figure 3). Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column that your cursor is on will now have a dashed line across its width. To extend the dashed line in the same row, across the other columns, leave your cursor where it is and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
C2	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ...indicating from-to
D2	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed lines will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line, or any other character, on your worksheet, repeat the operations above, using whatever character you chose as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row positions. The formulas and their positions are illustrated in Figure 4.

```
      A      B      C      D      E      F      G      H      I      J      K      L      M

1          QUARTERLY PAYROLL REPORT
2          -------------------------
3  FIRST MONTH                    SECOND MONTH                    YEAR TO DATE
4  ---------------------------------------------------------------------------------------------
5     GROSS   MISC   FED   FICA   GROSS   MISC   FED   FICA   GROSS   MISC   FED   FICA   TOTAL
6      PAY    W/H    W/H           PAY    W/H    W/H           PAY    W/H    W/H           FICA
7  ---------------------------------------------------------------------------------------------
8                                                  +A8+E8 ---> 0.00   0.00   0.00   0.00   0.00 <--- +L8#2
9                                                  0.00   0.00   0.00   0.00   0.00
10                                                 0.00   0.00   0.00   0.00   0.00
11                                                 0.00   0.00   0.00   0.00   0.00
12                                                 0.00   0.00   0.00   0.00   0.00
13                                                 0.00   0.00   0.00   0.00   0.00
14                                                 0.00   0.00   0.00   0.00   0.00
15                                                 0.00   0.00   0.00   0.00   0.00
16 ===========================================================================================
17    0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
      ^
   @SUM(A7...A16)
```

Figure 4

Formula number one, in the YEAR TO DATE, GROSS PAY column, takes the amount of gross pay in the first and second months, totals the amount and displays it in dollars and cents.

Place your cursor on I8 and type:

+	prepares coordinate to accept a numeric expression
A8	coordinate containing value
+	adds
E8	coordinate containing value
RETURN	enters the formula

Your next operation is to copy the YTD, GROSS PAY formula that you just entered across the row into the MISC W/H, FED W/H and FICA columns.

Place your cursor on I8 and type:

/R	starts REPLICATE COMMAND
RETURN	tells the command to copy the formula in I8
J8	first coordinate where you wish to copy the formulas across rows
.	ellipsis ... indicating from-to
L8	last coordinate where you wish to copy the formulas across rows
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location.

Formula number two, calculates the total amount of FICA due, by taking the amount in the FICA column and multiplying by two.

Place your cursor on M8 and type:

+	prepares coordinate to accept a numeric expression
L8	coordinate containing value
*	multiplies
2	value
RETURN	enters the formula

The next operation is to copy the formulas in the YTD, GROSS PAY, MISC W/H, FICA and TOTAL FICA down the columns.

Place your cursor on I8 and type:

/R	starts REPLICATE command
M8	copies all entries across columns I8 through M8
RETURN	prepares to receive additional information

I9	first coordinate where you wish to copy formulas down columns
.	ellipsis ... indicating from-to
I15	last coordinate where you wish to copy formulas down columns
RETURN	executes the command and prepares to receive additional instructions
R R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number three totals the first month's GROSS PAY column.

Place your cursor on A17 and type:

@SUM(	adds values in list
A7	first coordinate in the list
.	ellipsis ... indicating from-to
A16	last coordinate in the list
)	closes the list
RETURN	enters the formula

The next operation is to copy the formula just entered, at the bottom of the FIRST MONTH GROSS PAY column, across the columns, starting with the FIRST MONTH MISC W/H through the TOTAL FICA column.

Place your cursor on A17 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in A17
B17	first coordinate where you wish to copy the formulas across columns

.	ellipsis ... indicating from-to
M17	last coordinate where you wish to copy the formulas across columns
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

SAVING

Now that yolur QUARTERLY PAYROLL REPORT worksheet is completed, you will need to save it on a disk for later use.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
QTRLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on A1, the upper-left coordinate of the worksheet area rectangle that you wish to print, and type:

/P	start PRINT comamnd
P	printer
M17	the lower-right coordinate of the worksheet area rectangle that you wish to print
RETURN	executes the command

The last operation for you to perform is to clear memory of the QUARTERLY PAYROLL REPORT worksheet. To do this, type:

/C	starts CLEAR command
Y	yes, clears memory and executes the command

MAKING WORKSHEET ENTRIES

The first operation is making MONTHLY PAYROLL REPORT entries. To do this you must load the computer. (Computer memory should already be cleared.)

To load the MONTHLY PAYROLL REPORT worksheet into memory, type:

/S	starts STORAGE command
L	loads file
MTHLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

You are now ready to make entries to your monthly report as illustrated in Figure 5.

	A	B	C	D	E	F	G	H	I	J	K
1	EMPLOYEE	HOURLY	REG.	OT	DT	GROSS	MISC	FED	FICA	NET	YTD
2	NAME	RATE	HOURS	HOURS	HOURS	PAY	W/H	W/H		PAY	GROSS
3	---	---	---	---	---	---	---	---	---	---	---
4	TIFFANY	3.5	40	1	1	152.25		1.52	10.20	140.53	
5	TYLER	5.65	40	5		268.38		4.03	17.98	246.37	
6	WILLIAMS	9.55	40		4	458.40		11.46	30.71	416.23	
7	KING	9.55	40	2	3	467.95		11.70	31.35	424.90	
8						0.00		0.00	0.00	0.00	
9						0.00		0.00	0.00	0.00	
10						0.00		0.00	0.00	0.00	
11						0.00		0.00	0.00	0.00	
12	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========
13						1346.98	0.00	28.71	90.25	1228.02	0.00
14											
15											
16	FED W/H TABLE										
17	---	---	---	---	---	---					
18	0	100	200	300	400	500					
19	.005	.01	.015	.02	.025	.03					

Figure 5

Now that the entries are entered, you will need to update the QUARTERLY PAYROLL REPORT with the monthly payroll totals.

Place your cursor on F4 and type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
QTRLY.UPD	name of file; do not type spaces between words
RETURN	prepares to receive additional information
I11	lower right corner of worksheet to save
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

You may wish to save the entire worksheet for later use. To do this, type:

/S	starts STORAGE command
S	saves
MTH.ONE	name of file; do not type spaces between words
RETURN	executes the command

You now have to clear memory of the MONTHLY PAYROLL REPORT worksheet to allow you to load the QUARTERLY PAYROLL WORKSHEET.

To do this, type:

/C	starts CLEAR command
Y	yes, clears memory and executes the command

To load the QUARTERLY PAYROLL REPORT worksheet, type:

/S	starts STORAGE command
L	loads file
QTRLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

You are now ready to make entries to your QUARTERLY PAYROLL WORKSHEET, as illustrated in Figure 6.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		QUARTERLY PAYROLL REPORT											
2		---											
3	FIRST MONTH				SECOND MONTH				YEAR TO DATE				
4	---												
5	GROSS	MISC	FED	FICA	GROSS	MISC	FED	FICA	GROSS	MISC	FED	FICA	TOTAL
6	PAY	W/H	W/H		PAY	W/H	W/H		PAY	W/H	W/H		FICA
7	---												
8	152.25		1.52	10.20					152.25	0.00	1.52	10.20	20.40
9	268.38		4.03	17.98					268.38	0.00	4.03	17.98	35.96
10	458.40		11.46	30.71					458.40	0.00	11.46	30.71	61.43
11	467.95		11.70	31.35					467.95	0.00	11.70	31.35	62.71
12	0.00		0.00	0.00					0.00	0.00	0.00	0.00	0.00
13	0.00		0.00	0.00					0.00	0.00	0.00	0.00	0.00
14	0.00		0.00	0.00					0.00	0.00	0.00	0.00	0.00
15	0.00		0.00	0.00					0.00	0.00	0.00	0.00	0.00
16	==========												
17	1346.98	0.00	28.71	90.25	0.00	0.00	0.00	0.00	1346.98	0.00	28.71	90.25	180.49

Figure 6

To update the report with monthly payroll values, into the first month entries, place your cursor on A8 and type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
L	loads
QTRTLY.UPD	name of file; do not type spaces between words

RETURN	prepares to receive additional instructions
C	loads the values in column format and executes the command

Now you need to save this information on a disk for later use.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
QTRLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

Now we will have to save the gross YTD total from the QUARTERLY PAYROLL REPORT worksheet, so that it can be entered in the new MONTHLY PAYROLL REPORT worksheet to allow the accumulation of accurate FICA totals on the monthly worksheet.

Place your cursor on I8 and type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
YTD.TOT	name of file; do not type spaces between words
RETURN	prepares to receive additional information
I15	lower-right coordinate of the rectangle of value entries to be saved
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

The next operation is to clear the memory of the present worksheet (which you have already saved) and load the MONTHLY PAYROLL REPORT worksheet.

To do this, you will type:

/C	starts CLEAR Command
Y	Yes, clears memory and executes the command

To load the MONTHLY PAYROLL WORKSHEET, type:

/S	starts STORAGE command
L	loads file
MONTHLY.RPT	name of file; do not type spaces between words
RETURN	executes the command

Before making the monthly payroll entries, you will need to load the YTD.TOT file, so that the FICA column will calculate properly.

Place your cursor on K4 and type:

/S	starts STORAGE command
#	Saves a (DIF) Data Interchange Format file
L	loads file
YTD.TOT	name of file
RETURN	prepares to receive additional instructions
C	loads the values in column format and executes the command

Your worksheet is ready for the monthly pay entries, which are illustrated in Figure 7 as you start the updating process again.

	A	B	C	D	E	F	G	H	I	J	K
1	EMPLOYEE	HOURLY	REG.	OT	DT	GROSS	MISC	FED	FICA	NET	YTD
2	NAME	RATE	HOURS	HOURS	HOURS	PAY	W/H	W/H		PAY	GROSS
3	---	---	---	---	---	---	---	---	---	---	---
4						0.00		0.00	0.00	0.00	152.25
5						0.00		0.00	0.00	0.00	268.375
6						0.00		0.00	0.00	0.00	458.4
7						0.00		0.00	0.00	0.00	467.95
8						0.00		0.00	0.00	0.00	0
9						0.00		0.00	0.00	0.00	0
10						0.00		0.00	0.00	0.00	0
11						0.00		0.00	0.00	0.00	0
12	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========
13						0.00	0.00	0.00	0.00	0.00	1346.98
14											
15											
16	FED W/H TABLE										
17	---	---	---	---	---	---					
18	0	100	200	300	400	500					
19	.005	.01	.015	.02	.025	.03					

Figure 7

EXERCISE TEN

MONTHLY SALES REPORTING

DESCRIPTION

VisiCalc has the capability of formating, updating, performing calculations and totaling multiple reports on one worksheet. This can save time in the summarization of multiple reports because the summarization is updated simultaneously as entries are made to individual reports.

To demonstrate VisiCalc's ability, a MONTHLY SALES REPORT worksheet been set up. In this worksheet we have set up MONTHLY SALES REPORTS for two salespersons. We have also set up a MONTHLY SALES REPORT SUMMARY, to summarize the two sales reports. Entries that are made to the MONTHLY SALES REPORTS will simultaneously update the MONTHLY SALES REPORT SUMMARY.

OPERATIONS PERFORMED

Setting Up The Worksheet

Entering Mathematical Formulas

Making Worksheet Entries

Saving

Printing

FUNCTIONS USED

LOOKUP
SUM
MAX
IF
AND
AVERAGE
NA

COMMANDS USED

REPEAT LABEL	
FORMAT	I = integer
FORMAT	R = justifies right
GLOBAL	$ = dollars and cents
REPLICATE	copies
STORAGE	saves
PRINT	
GLOBAL	manual calculate

SETTING UP THE WORKSHEET FORMAT

The worksheet that you will set up consists of two MONTHLY SALES REPORTS, which are summarized in a MONTHLY SALES REPORT SUMMARY. To set up this worksheet, use the following directions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

To format all coordinates to display value entries in dollars and cents, type:

/G	starts GLOBAL command
F	FORMAT
$	dollars and cents

To set up the worksheet for manual calculation, type:

/G	starts GLOBAL command
R	recalculates
M	manual

To enter your column labels, place your cursor on the location where you want to make your entry. VisiCalc automatically left justifies the label. To right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type the column label.

```
        A        B        C        D        E        F        G        H        I        J        K        L

1          MONTH:                  COMMISSION BASE ===
2      DAYS/MTH                                  TOTAL    SALES  AVERAGE     PRO-
3            DAY  PROD. A  PROD. B  PROD. C    SALES NEED/DAY SALE/DAY  JECTION
4      ------------------------------------------------------------------
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28     ==================================================================
29
30
31                             COMMISSION BASE ===
32                                           TOTAL    SALES  AVERAGE     PRO-
33           DAY  PROD. A  PROD. B  PROD. C    SALES NEED/DAY SALE/DAY  JECTION
34     ------------------------------------------------------------------
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58     ==================================================================================================
59
60
61                      MONTHLY SALES REPORT SUMMARY
62                      ----------------------------
63                                           TOTAL
64           DAY  PROD. A  PROD. B  PROD. C    SALES
65     ---------------------------------------------
66
67
68     COMMISSION FOR SALESPERSON NUMBER ONE
69     COMMISSION FOR SALESPERSON NUMBER TWO
70                                         =========
71                      TOTAL COMMISSION
72
73     WORKING DAYS PER MONTH TABLE
74     ----------------------------
75           0        2        3        4        5        6        7        8        9       10       11       12
76          21       20       23       22       20       22       22       22       22       21       21       23
```

Figure 1

Depressing the cursor (directional) key enters the label into the location and allows the cursor to be advanced to the next location.

NOTE

When entering a label that contains more characters than the width of the column allows, you must move the cursor to the next adjacent column and continue typing the label.

Type in the rest of your column headings, using the sequence of commands above.

To enter dashed lines on your worksheet, place your cursor on the column and row where you want your dashed line to start (coordinate A4 in Figure 1), and type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column that your cursor is on will now have a dashed line across its width. To extend the dashed line, in the same row, across the other columns, leave the cursor on A4 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B4	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
H4	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line on your worksheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row locations. The formulas and their locations are illustrated in Figure 2.

Formula number one, in the DAYS/MONTH column, looks up in the reference table the number of working days in the month, using the value in the MONTH row (which will be entered when you make your worksheet entries).

Place your cursor on B2 and type:

@LOOKUP(	starts LOOKUP function
B1	coordinate containing value to look up
,	comma, separates LOOKUP value from the reference table
A75	first coordinate in the reference table
.	ellipsis ... indicating from-to
L75	last coordinate in the reference table
)	closes LOOKUP function
RETURN	enters the formula
/F	starts FORMAT command
I	displays the value as an integer

Formula number two, in the DAY column, of the first MONTHLY SALES REPORT, sequentially increases the day, from the top to the bottom of the column. It is a three-part process as follows:

```
        A        B        C        D        E        F        G        H        I        J        K        L
1     MONTH:                  COMMISSION BASE ===
2   DAYS/MTH        21                        TOTAL    SALES  AVERAGE     PRO-
3        DAY  PROD. A  PROD. B  PROD. C     SALES NEED/DAY SALE/DAY  JECTION
4   ---------------------------------------------------------------------------
5          1  @LOOKUP(B1,A75...L75)        0.00     0.00     0.00     0.00   +G5*B2
6   1+A5 → 2                 @SUM(B5...D5)  0.00     0.00     0.00     0.00   @AVERAGE(E5...E5)
7          3                                0.00     0.00     0.00     0.00   (F1-@SUM(E5...E5))/(@IF(B2-A5<=0,@NA,B2-A5))
8          4                                0.00     0.00     0.00     0.00
9          5                                0.00     0.00     0.00     0.00
10         6                                0.00     0.00     0.00     0.00
11         7                                0.00     0.00     0.00     0.00
12         8                                0.00     0.00     0.00     0.00
13         9                                0.00     0.00     0.00     0.00
14        10                                0.00     0.00     0.00     0.00
15        11                                0.00     0.00     0.00     0.00
16        12                                0.00     0.00     0.00     0.00
17        13                                0.00     0.00     0.00     0.00
18        14                                0.00     0.00     0.00     0.00
19        15                                0.00     0.00     0.00     0.00
20        16                                0.00     0.00     0.00     0.00
21        17                                0.00     0.00     0.00     0.00
22        18                                0.00     0.00     0.00     0.00
23        19                                0.00     0.00     0.00     0.00
24        20                                0.00     0.00     0.00     0.00
25        21                                0.00       NA     0.00     0.00
26        22                                0.00       NA     0.00     0.00
27        23                                0.00       NA     0.00     0.00
28  ===========================================================================
29              0.00     0.00     0.00     0.00
30  @SUM(B4...B28)
31                          COMMISSION BASE ===
32                                        TOTAL    SALES  AVERAGE     PRO-
33       DAY  PROD. A  PROD. B  PROD. C     SALES NEED/DAY SALE/DAY  JECTION
34  ---------------------------------------------------------------------------
35         1                @SUM(B35...D35)  0.00     0.00     0.00     0.00   +G35*B2
36  1+A35 → 2                                0.00     0.00     0.00     0.00   @AVERAGE(E35...E35)
37         3                                0.00     0.00     0.00     0.00   (F31-(@SUM(E35...E35))/(@IF(B2-A35<=0,@NA,B2-A35))
38         4                                0.00     0.00     0.00     0.00
39         5                                0.00     0.00     0.00     0.00
40         6                                0.00     0.00     0.00     0.00
41         7                                0.00     0.00     0.00     0.00
42         8                                0.00     0.00     0.00     0.00
43         9                                0.00     0.00     0.00     0.00
44        10                                0.00     0.00     0.00     0.00
45        11                                0.00     0.00     0.00     0.00
46        12                                0.00     0.00     0.00     0.00
47        13                                0.00     0.00     0.00     0.00
48        14                                0.00     0.00     0.00     0.00
49        15                                0.00     0.00     0.00     0.00
50        16                                0.00     0.00     0.00     0.00
51        17                                0.00     0.00     0.00     0.00
52        18                                0.00     0.00     0.00     0.00
53        19                                0.00     0.00     0.00     0.00
54        20                                0.00     0.00     0.00     0.00
55        21                                0.00       NA     0.00     0.00
56        22                                0.00       NA     0.00     0.00
57        23                                0.00       NA     0.00     0.00
58  ===========================================================================
59              0.00     0.00     0.00     0.00
60  @SUM(B34...B58)
61                     MONTHLY SALES REPORT SUMMARY
62                     ----------------------------
63                                        TOTAL
64       DAY  PROD. A  PROD. B  PROD. C     SALES
65  ---------------------------------------------
66  @SUM(B29,B59) → 0.00     0.00     0.00     0.00
67
68  COMMISSION FOR SALESPERSON NUMBER ONE      4.80 ← @IF(@AND(E29>=F1,E59>=F31),(E29-F1)*.12,@MAX(0,E29-F1)*.1
69  COMMISSION FOR SALESPERSON NUMBER TWO      0.00 ← @IF(@AND(E59>=F31,E29>=F1),(E59-F31)*.12,@MAX(0,E59-F31)*.1
70                                         =========
71                 TOTAL COMMISSION           4.80 ← @SUM(E68...E70)
72
73  WORKING DAYS PER MONTH TABLE
74  ----------------------------
75        0        2        3        4        5        6        7        8        9       10       11       12
76       21       20       23       22       20       22       22       22       22       21       21       23
```

Figure 2

Step one, place your cursor on A5 and type:

/F	starts FORMAT command
I	displays the value as an integer
1	value
RETURN	enters the value

You have just assigned the value of one to coordinate A5.

Step two, you will enter a formula which will generate the value in the next coordinate in the column.

Place your cursor on A6 and type:

/F	starts FORMAT command
I	displays the value as an integer
1	value
+	adds
A5	coordinate containing value
RETURN	enters the formula

Step three, is to copy this formula down the column, using the REPLICATE command, to allow the values to be sequentially increased in the coordinates in the column.

Place your cursor on A6 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in A6
A7	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
A27	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number three, in the TOTAL SALES column, adds the daily sales in columns labeled PROD. A, PROD. B, and PROD. C, and displays the total amount sold.

Place your cursor on E5 and type:

@SUM(	adds values in the list
B5	first coordinate in the list
.	ellipsis ... indicating from-to
D5	last coordinate in the list
)	closes the list
RETURN	enters the formula

Your next operation is to copy the formula just entered, down the column, using the REPLICATE command.

Place your cursor on E5 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in E5
E6	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
E27	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number four, in the SALES NEED/DAY column, utilizes the IF logic function and the NA function to calculate the sales needed per day to reach the commission base.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

The NA function for this exercise means NOT APPLICABLE, and is displayed on the last working day of the month and on every day thereafter.

Place your cursor on F5 and type:

(	opens first expression in formula
F1	coordinate containing value
-	subtracts
@SUM(	adds values in the list
E5	first coordinate in the list
.	ellipsis ... indicating from-to
E5	last coordinate in the list
)	closes the list
)	closes first expression
/	divides
(	opens second expression in the formula
@IF(	starts IF logic function
B2-A5	part of the first expression, which generates the first value to be compared
<=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false
0	the second value to be compared

,	comma-separates expressions in the IF function
@NA	second expression in the IF function, which will be selected if the first expression is true
,	comma-separates expressions in the IF function
B2-A5	third expression in the IF function, generates the value which will be selected if the first expression is false
)	closes IF logic function
)	closes second expression
RETURN	enters formula

Your next operation is to copy the formula you just entered, down the column, using the REPLICATE command.

Place your cursor on F5 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in F5
F6	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
F27	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
N N	tells the command to copy the coordinate address in the formula in its new location without change
R	tells the command to copy the coordinate address in the formula relative to its new location

N
R
N
R

Formula number five, in the AVERAGE SALE/DAY column, calculates the average amount of sales per day.

Place your cursor on G5 and type:

@AVERAGE(	averages the values in the list
E5	first coordinate in the list
.	ellipsis ... indicating from-to
E5	last coordinate in the list
)	closes the list
RETURN	enters the formula

The next operation is to copy this formula down the column, using the REPLICATE command, to allow each coordinate to display its appropriate daily average.

Place your cursor on G5 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in G5
G6	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
G27	last coordinate where you wish to copy the formula down the column
RETURN	executes the command prepares to receive additional instructions
N	tells the command to copy the coordinate address in the formula in its new location without change
R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number six, in the PROJECTION column, takes the average sales per day and multiplies it times the number of working days in the month to determine a projected total sales figure for the month.

Place your cursor on H5 and type:

+	prepares the coordinate to accept a numeric expression
G5	coordinate containing value
*	multiplies
B2	coordinate containing value
RETURN	enters the formula

Your next operation is to copy the formula just entered, down the column, using the REPLICATE command.

Place your cursor on H5 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in H5
H6	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
H27	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

Formula number seven, at the bottom of the PROD. A column, adds the total daily sales of Product A, to give you a monthly sales total.

Place your cursor on B29 and type:

@SUM(	adds values in the list
B4	first coordinate in the list
.	ellipsis ... indicating from-to

B28	last coordinate in the list
)	closes the list
RETURN	enters the formula

Your next operation is to copy the formula entered above, using the REPLICATE command, across the bottom of the PROD. B, PROD. C and TOTAL SALES row.

Place your cursor on B29 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in B29
C29	first coordinate where you wish to copy the formulas across rows
.	ellipsis ... indicating from-to
E29	last coordinate where you wish to copy the formulas across rows
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number eight, in the DAY column, of the second MONTHLY SALES REPORT, sequentially increases the day, from the top to the bottom of the column. It is a three-step process as follows:

Step one, place your cursor on A35 and type:

/F	starts FORMAT command
I	displays the value as an integer
1	value
RETURN	enters the value

You have just assigned the value of one to coordinate A36.

Step two, you will enter a formula, which will generate the value in the next coordinate in the column.

Place your cursor on A36 and type:

/F	starts FORMAT command
I	displays the value as an integer
1	value
+	adds
A35	coordinate containing value
RETURN	enters the formula

Step three, is to copy this formula down the column, using the REPLICATE command, to allow the sequential increase in the coordinates in the column.

Place your cursor on A36 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in A36
A37	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
A57	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number nine, in the TOTAL SALES column, adds the daily sales in columns labeled PROD.A, PROD.B and PROD.C and displays the total at the bottom of the TOTAL SALES column.

Place your cursor on E35 and type:

@SUM(	adds values in the list
B35	first coordinate in the list
.	ellipsis ... indicating from-to
D35	last coordinate in the list

)	closes the list
RETURN	enters the formula

Your next operation is to copy the formula just entered, down the column, using the REPLICATE command.

Place your cursor on E35 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in E35
E36	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
E57	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location.

Formula number ten, in the SALES NEED/DAY column, utilizes IF logic function and the NA function to calculate the sales needed per day to reach the commission base.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

The NA function, for this exercise, means NOT APPLICABLE, and is displayed on the last working day of the month and on every day thereafter.

Place your cursor on F35 and type:

(	opens first expression in formula
F31	coordinate containing value
-	subtracts

(@SUM(	adds values in the list
E35	first coordinate in the list
.	ellipsis ... indicating from-to
E35	last coordinate in the list
)	closes the list
)	closes first expression
/	divides
(	opens second expression in the formula
@IF(	starts IF logic function
B2-A35	part of the first expression which generates the first value to be compared
<=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false
0	second value to be compared
,	comma-separates expressions in the IF function
@NA	second expression in the IF function which is selected if the first expression is true
,	comma, separates expressions in the IF function
B2-A35	third expression, generates the value to be compared, which will be selected if the first expression is false
)	closes IF logic function
)	closes the formula
RETURN	enters the formula

Your next operation is to copy the formula just entered, down the column, using the REPLICATE command.

Place your cursor on F35 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in F35
F36	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
F57	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
N N	tells the command to copy the coordinate address in the formula in its new location without change
R	tells the command to copy the coordinate address in the formula relative to its new location
N R N R	

Formula number eleven, in the AVERAGE SALE/DAY column, calculates the average amount of sales per day.

Place your cursor on G35 and type:

@AVERAGE(	averages values in the list
E35	first coordinate in the list
.	ellipsis ... indicating from-to
E35	last coordinate in the list
)	closes list
RETURN	enters the formula

The next operation is to copy this formula down the column, using the REPLICATE command, to allow each coordinate in the column to display its appropriate daily average.

Place your cursor on G35 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in G35
G36	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
G57	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
N	tells the command to copy the coordinate address in the formula in its new location without change
R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number twelve, in the PROJECTION column, takes the average sales per day and multiplies it times the number of working days in the month, to determine a projected total sales figure for the month.

Place your cursor on H35 and type:

+	prepares the coordinate to accept a numeric expression
G35	coordinate containing value
*	multiplies
B2	coordinate containing value
RETURN	enters formula

Your next operation is to copy the formula just entered, down the column, using the REPLICATE command.

Place your cursor on H35 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in H35

H36	first coordinate where you wish to copy the formula down the column
.	ellipsis ... indicating from-to
H57	last coordinate where you wish to copy the formula down the column
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

Formula number thirteen, at the bottom of the PROD. A column, adds the total daily sales of Product A, to give you a monthly sales total.

Place your cursor on B59 and type:

@SUM(	adds values in the list
B34	first coordinate in the list
.	ellipsis ... indicating from-to
B58	last coordinate in the list
)	closes list
RETURN	enters formula

Your next operation is to copy the formula entered above, across the bottom of the PROD. B, PROD. C and TOTAL SALES row.

Place your cursor on B59 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in B59
C59	first coordinate where you wish to copy the formula across rows
.	ellipsis ... indicating from-to

E59	last coordinate where you wish to copy the formula across rows
RETURN	executes the command and prepares to receive additional instructions
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number fourteen, in the PROD. A column, of the MONTHLY SALES REPORT SUMMARY, totals the amount of Product A sold in both of the MONTHLY SALES REPORTS.

Place your cursor on B66 and type:

@SUM(	adds values in the list
B29	coordinate containing value in the list
,	comma-separates values in the list
B59	coordinate containing value in the list
)	closes the list
RETURN	enters the formula

The next operation is to copy the formula just entered above, using the REPLICATE command, across the PROD. B, PROD. C and total sales row.

Place your cursor on B66 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in B66
C66	first coordinate where you wish to copy the formula across rows
.	ellipsis ... indicating from-to
E66	last coordinate where you wish to copy the formula across rows
RETURN	executes the command and prepares to receive additional instructions

R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number fifteen, in the COMMISSION FOR SALESPERSON NUMBER ONE row, calculates the salesperson's commission, which is based on two factors. First, that he receives a ten percent commission on any amount over the base amount that is set. Second, that he receives a twelve percent commission on any sale amount over the base amount that is set, if both he and the other salesperson surpass their base commission amount.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

This formula utilizes AND logic function, which is true if all the values in the list are true and is otherwise false.

Place your cursor on E68 and type:

@IF(	starts IF logic function
@AND(	starts AND logic function
E29	Coordinate containing value to be compared
>=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false
F1	coordinate containing second value to be compared
,	comma-separates expressions in AND function
E59	coordinate containing value
>=	LOGICAL OPERATORS, compare the first value against the second value and result in the logical value of true or false

F31	coordinate containing second value to be compared
)	closes AND function. Ends first expression in the IF function
,	comma, separates expressions in IF function
(	opens second expression in IF function
E29	coordinate containing value
-	subtracts
F1)	coordinate containing value
*	multiplies
.12	value
,	comma-separates expressions in IF function
@MAX(	opens third expression of IF function, which generates the value to be compared, which will be selected if the first expression is false
0	first value to be compared
,	comma, separates values in the expression
E29	coordinate containing value
-	subtracts
F1	coordinate containing value
)	closes IF logic function
*	multiplies
.1	value
RETURN	enters the formula

Formula number sixteen, in the COMMISSION FOR SALESPERSON NUMBER TWO row, calculates that if the salesperson has reached his base commission amount, or is below that amount, in total sales for the month, then he is paid his base commission. If he has surpassed his base commission amount in total sales, then the base commission amount is subtracted from the total sales figure and the salesman is paid an additional commission, at a set rate (which is entered when you make your worksheet entries), on the difference between the two figures.

NOTE

IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

This formula utilizes the AND logic function, which is true if all the values in the list are true and is otherwise false.

Place your cursor on E69 and type:

@IF(	starts IF logic function
@AND(	starts AND logic function
E59	part of the first expression which generates the first value to be compared
>=	LOGICAL OPERATORS, compare the first value against the second value and result in a logical value of true or false
F31	coordinate containing second value to be compared
,	comma-separates values in AND function
E29	coordinate containing value
>=	LOGICAL OPERATORS, compare the first value against the second value and result in a logical value of true or false.

F1	coordinate containing value
)	closes AND function. Ends first expression in IF function
,	comma-separates expressions in IF function
(E59	coordinate containing value, opens second expression in IF function, which generates the value to be compared, which will be selected if the first expression is true
-	subtracts
F31)	coordinate containing value
*	multiplies
.12	value
,	comma-separates expressions in IF function
@MAX(	opens third expression in IF function, which generates the value to be compared, which will be selected if the first expression is false
0	first value to be compared
,	comma-separates values in the expression
E59	coordinate containing value
-	subtracts
F31	coordinate containing value
)	closes IF logic function
*	multiplies
.1	value
RETURN	enters formula

Formula number seventeen, in the TOTAL COMMISSION row, calculates the total amount of commission for salesman one and salesman two.

Place your cursor on E71 and type:

@SUM(	adds values in the list
E68	coordinate containing value
.	ellipsis ... indicating from-to
E70	coordinate containing value
)	closes list
RETURN	enters formula

PRINTING

Now that your MONTHLY SALES REPORT WORKSHEET is completed, you may wish to print it for filing or distribution.

Place your cursor on A1, the upper-left coordinate of the worksheet area rectangle that you wish to print, and type:

/P	starts PRINT command
P	printer
L76	lower-right coordinate of the worksheet area rectangle that you wish to print
RETURN	executes the command

MAKING WORKSHEET ENTRIES

You are now ready to make entries to your MONTHLY SALES REPORT worksheet as illustrated in Figure 3.

To start making worksheet entries, first enter the month that the report is for in B1. Then enter the commission base for each report in F1 and F31. Then enter the daily sales of each product by each salesperson.

Now that you have made the worksheet entries as illustrated in Figure 3, you may wish to save the entire worksheet for later use.

	A	B	C	D	E	F	G	H	I	J	K	L
1	MONTH:	2		COMMISSION BASE ===		7000.00						
2	DAYS/MTH	20			TOTAL	SALES	AVERAGE	PRO-				
3	DAY	PROD. A	PROD. B	PROD. C	SALES	NEED/DAY	SALE/DAY	JECTION				
4	----------											
5	1	125.00	75.00	25.00	225.00	356.58	225.00	4500.00				
6	2	50.00	68.00	90.00	208.00	364.83	216.50	4330.00				
7	3	75.00	25.00	35.00	135.00	378.35	189.33	3786.67				
8	4				0.00	402.00	142.00	2840.00				
9	5				0.00	428.80	113.60	2272.00				
10	6				0.00	459.43	94.67	1893.33				
11	7				0.00	494.77	81.14	1622.86				
12	8				0.00	536.00	71.00	1420.00				
13	9				0.00	584.73	63.11	1262.22				
14	10				0.00	643.20	56.80	1136.00				
15	11				0.00	714.67	51.64	1032.73				
16	12				0.00	804.00	47.33	946.67				
17	13				0.00	918.86	43.69	873.85				
18	14				0.00	1072.00	40.57	811.43				
19	15				0.00	1286.40	37.87	757.33				
20	16				0.00	1608.00	35.50	710.00				
21	17				0.00	2144.00	33.41	668.24				
22	18				0.00	3216.00	31.56	631.11				
23	19				0.00	6432.00	29.89	597.89				
24	20				0.00	NA	28.40	568.00				
25	21				0.00	NA	27.05	540.95				
26	22				0.00	NA	25.82	516.36				
27	23				0.00	NA	24.70	493.91				
28	==========											
29		250.00	168.00	150.00	568.00							
30												
31				COMMISSION BASE ===		9000.00						
32					TOTAL	SALES	AVERAGE	PRO-				
33	DAY	PROD. A	PROD. B	PROD. C	SALES	NEED/DAY	SALE/DAY	JECTION				
34	----------											
35	1	590.00	80.00	65.00	735.00	435.00	735.00	14700.00				
36	2	150.00	75.00	25.00	250.00	445.28	492.50	9850.00				
37	3	36.00	190.00	178.00	404.00	447.71	463.00	9260.00				
38	4				0.00	475.69	347.25	6945.00				
39	5				0.00	507.40	277.80	5556.00				
40	6				0.00	543.64	231.50	4630.00				
41	7				0.00	585.46	198.43	3968.57				
42	8				0.00	634.25	173.63	3472.50				
43	9				0.00	691.91	154.33	3086.67				
44	10				0.00	761.10	138.90	2778.00				
45	11				0.00	845.67	126.27	2525.45				
46	12				0.00	951.38	115.75	2315.00				
47	13				0.00	1087.29	106.85	2136.92				
48	14				0.00	1268.50	99.21	1984.29				
49	15				0.00	1522.20	92.60	1852.00				
50	16				0.00	1902.75	86.81	1736.25				
51	17				0.00	2537.00	81.71	1634.12				
52	18				0.00	3805.50	77.17	1543.33				
53	19				0.00	7611.00	73.11	1462.11				
54	20				0.00	NA	69.45	1389.00				
55	21				0.00	NA	66.14	1322.86				
56	22				0.00	NA	63.14	1262.73				
57	23				0.00	NA	60.39	1207.83				
58	==========											
59		776.00	345.00	268.00	1389.00							
60												
61			MONTHLY SALES REPORT SUMMARY									
62			----------									
63					TOTAL							
64	DAY	PROD. A	PROD. B	PROD. C	SALES							
65	----------											
66		1026.00	513.00	418.00	1957.00							
67												
68	COMMISSION FOR SALESPERSON NUMBER ONE				0.00							
69	COMMISSION FOR SALESPERSON NUMBER TWO				0.00							
70					=========							
71			TOTAL COMMISSION		0.00							
72												
73	WORKING DAYS PER MONTH TABLE											
74	----------											
75	0	2	3	4	5	6	7	8	9	10	11	12
76	21	20	23	22	20	22	22	22	22	21	21	23

Figure 3

SAVING

To save the entire worksheet for later use, type:

/S	starts STORAGE command
S	saves
MTH.SR	name of file; do not type spaces between words
RETURN	executes the command

EXERCISE ELEVEN

DAILY INVENTORY

DESCRIPTION

VisiCalc has the ability to accumulate totals, and have those totals updated. To do this, blocks of values must be saved, reentered, updated and saved again. VisiCalc also has the capability to assign a word value, to a coordinate, of TRUE, FALSE or NA, as the result of a logical operation.

To demonstrate VisiCalc's ability, a DAILY INVENTORY REPORT worksheet has been set up. Updating functions are performed on a daily basis and the entire TOTAL CASES column is saved at the end of each day and the CASES REC'D and CASES SOLD columns are cleared. The TOTAL CASES column values are then reentered in the CASES ON HAND column and the worksheet is ready for the next day's inventory process. The REORDER TIME column tells you when it is time to reorder by displaying the word TRUE when the REORDER QUANTITY column reaches its minimum stocking amount. At all other times, the REORDER TIME column will display NA (not applicable) because it is not yet time to reorder.

OPERATIONS PERFORMED

Setting Up the Worksheet Format

Entering Mathematical Formulas

Making Worksheet Entries

Clearing Worksheet Entries

Saving Worksheet

Loading Worksheet

Printing

FUNCTIONS USED

MAX
TRUE
NA
SUM
IF

COMMANDS USED

REPEAT LABEL	
BLANK	
FORMAT	R = justifies right
FORMAT	$ = dollars and cents
REPLICATE	copies
STORAGE	# saves a (DIF) Data Interchange Format file
STORAGE	# loads a (DIF) Data Interchange Format file
PRINT	

SETTING UP THE WORKSHEET FORMAT

The worksheet that you will set up consists of the DAILY INVENTORY REPORT. To set up this worksheet, use the following instructions, copying Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

	A	B	C	D	E	F	G	H	I
1	ITEM	REORDER	COST	CASES	CASES	CASES	TOTAL	TOTAL	REORDER
2	NUMBER	QUANTITY	PER CASE	REC'D	SOLD	ON HAND	CASES	COST	TIME
3	---	---	---	---	---	---	---	---	---
4									
5									
6									
7									
8	==========	==========	==========	==========	==========	==========	==========	==========	==========
9									

Figure 1

To enter your column labels, place your cursor on the location where you want to make your entry. (VisiCalc automatically left justifies the label.) To right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type the column label.

Depressing the cursor (directional) key, enters the label into the location and allows the cursor to be advanced to the next location.

Type in the rest of your column headings, using the sequence of commands above.

To enter dashed lines on your worksheet, place your cursor on column and row where you want your dashed line to start (coordinate A3 in Figure 1), and type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	enters the label

The column that your cursor is on will now have a dashed line across its width. To extend the dashed line, in the same row, across the other columns, leave your cursor where it is and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B3	first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
I3	last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line on your worksheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row locations. The formulas and their locations are illustrated in Figure 2.

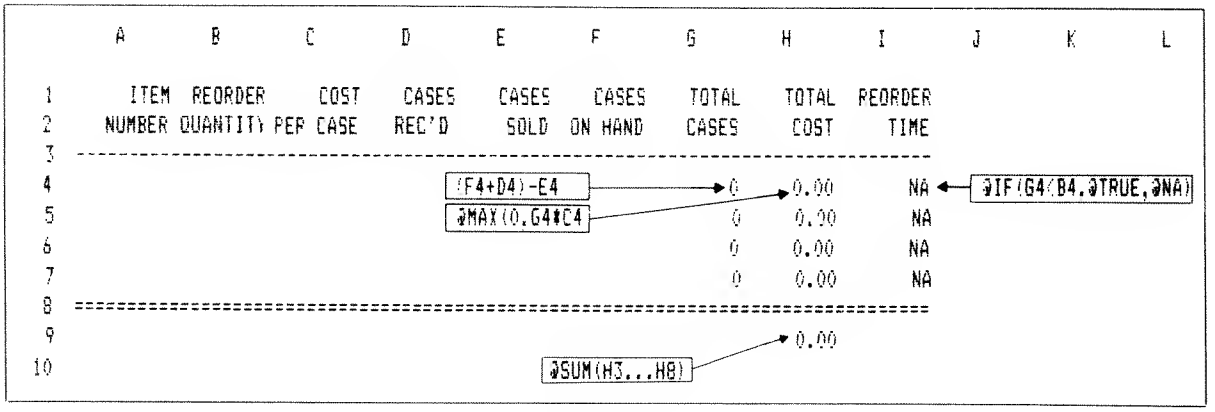

Figure 2

Formula number one, adds, in the same row, the CASES REC'D column and the CASES ON HAND column and, from that total, subtracts the CASES SOLD column, in the same row. The value generated is then displayed in the TOTAL CASES column of the same row.

Place your cursor on G4 and type:

(	opens expression
F4	coordinate containing value
+	adds
D4	coordinate containing value
)	closes expression
-	subtracts
E4	coordinate containing value
RETURN	enters the formula

Formula number two, in the TOTAL COST column, determines the total cost of each inventory item. The MAX logic function is used so that a zero value will be displayed if the item is out of stock. Otherwise, a minus amount could be displayed, because a negative amount would be totaled.

Place your cursor on H4 and type:

@MAX	selects the maximum value of the following list
(	opens the list
0	value in the list
,	comma-separates values in the list
G4	coordinate containing value
*	multiplies
C4	coordinate containing value
)	closes the list
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

Formula number three, in the REORDER TIME column, uses IF logic function to determine if it is time to reorder an item. If it is time to reorder, it displays the word TRUE; if not, it displays NA.

NOTE

> IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

Place your cursor on I4 and type:

@IF(	starts IF logic function
G4	part of the first expression, which generates the first value to be compared
<	LOGICAL OPERATOR, compares the first value against the second value and results in the logical value of true or false

B4	coordinate containing the second value to be compared
,	comma-separates expressions in the IF function
@TRUE	TRUE function produces a logical value TRUE, which is the second expression in the IF function and which will be selected if the first expression is true
,	comma-separates expressions in the IF function
@NA	NA function produces a logical value NA, which is the third expression of the IF function, which will be selected if the first expression is false
)	closes IF logic function
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formulas at the top of the TOTAL CASES, TOTAL COST and REORDER TIME columns, down the columns.

Place your cursor on G4 and type:

/R	starts REPLICATE command
I4	copies all entries across columns G4 through I4
RETURN	prepares to receive additional information
G5	first coordinate where you wish to copy the formulas down columns
.	ellipsis ... indicating from-to
G7	last coordinate where you wish to copy the formulas down columns

RETURN	executes the command and prepares to receive additional instructions
R R R R R R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number four, at the bottom of the TOTAL COST column, totals the cost of the entire inventory, and displays that amount in dollars and cents.

Place your cursor on H9 and type:

@SUM(	adds values in the list
H3	first coordinate in the list
.	ellipsis ... indicating from-to
H8	last coordinate in the list
)	closes the list
RETURN	enters the formula
/F	starts FORMAT command
$	displays in dollars and cents

PRINTING

Now that your DAILY INVENTORY REPORT WORKSHEET is completed, you will need to print the formulas for later use.

To print the formulas, type:

/S	starts STORAGE command
S	saves
.PRINTER	prints the file
RETURN	executes the command

MAKING WORKSHEET ENTRIES

You are now ready to make entries to your DAILY INVENTORY REPORT WORKSHEET as illustrated in Figure 3.

	A	B	C	D	E	F	G	H	I
1	ITEM	REORDER	COST	CASES	CASES	CASES	TOTAL	TOTAL	REORDER
2	NUMBER	QUANTITY	PER CASE	REC'D	SOLD	ON HAND	CASES	COST	TIME
3									
4	100	10	5.25	20	5		15	78.75	NA
5	200	15	6.35	20	2.00		18	114.30	NA
6	300	25	9.55	30	5		25	238.75	NA
7	400	10	14.55	12	5		7	101.85	TRUE
8									
9								533.65	

Figure 3

SAVING

Now that you have made the worksheet entries as illustrated above, and the worksheet is complete for the day, you may wish to save the entire worksheet for later use, or print it for distribution.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves
INV.RPT.	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

To print a portion or all of your worksheet for filing or distribution, place your cursor on A1, the upper-left coordinate of the worksheet rectangle that you wish to print, and type:

/P	starts PRINT command
P	printer

Type in I9, the lower-right coordinate of the worksheet area rectangle that you wish to print.

RETURN	executes the command

SAVING

Now we will have to save the totals in the TOTAL CASES columns of the current DAILY INVENTORY REPORT, so that they can be reentered in the CASES ON HAND column before entering the next day's inventory information, to allow the accumulation of accurate totals in the TOTAL CASES column of the new DAILY INVENTORY REPORT.

Place your cursor on G4 and type:

/S	starts STORAGE command
#	saves a (DIF) Data Interchange Format file
S	saves
TOT.CASES	name of file; do not type spaces between words
RETURN	prepares to receive additional information
G7	lower-right coordinate of the rectangle of value entries to be saved
RETURN	prepares to receive additional instructions
C	saves the values in column format and executes the command

You will now want to update the worksheet to prepare for tomorrow's entries by entering the TOTAL CASES file into the CASES ON HAND column, as illustrated in Figure 4.

Place your cursor on F4 and type:

/S	starts STORAGE command
#	loads a (DIF) Data Interchange Format file
L	loads
TOT.CASES	name of file; do not type spaces between words

RETURN	prepares to receive additional instructions
C	loads the values in column format and executes the command

It will be necessary to blank out the entries in the CASES REC'D and CASES SOLD columns to allow for tomorrow's entries into those columns. To do this, we will enter a blank in coordinate D4 and replicate it down and across the two columns.

Place your cursor on D4 and type:

/B	starts BLANKOUT command
RETURN	tells the command to copy the blank in D4

Now copy the blank down the column, using the REPLICATE command.

Leave the cursor on D4 and type:

/R	starts REPLICATE command
RETURN	prepares to receive additional information
D5	first coordinate where you wish to copy the blank down the column
.	ellipsis ... indicating from-to
D7	last coordinate where you wish to copy the blank down the column
RETURN	executes the command

You have just blanked out the entries in the CASES REC'D column and your next operation is to copy that blank column into the CASES SOLD column.

Place your cursor on D4 and type:

/R	starts REPLICATE command
D7	last coordinate in column
RETURN	prepares to receive additional information
E4	top coordinate of column into which the blank is to be entered
RETURN	executes the command

Your DAILY INVENTORY REPORT WORKSHEET is now updated and ready to have new entries made as you repeat the entry and updating process for the new day.

	A	B	C	D	E	F	G	H	I
1	ITEM	REORDER	COST	CASES	CASES	CASES	TOTAL	TOTAL	REORDER
2	NUMBER	QUANTITY	PER CASE	REC'D	SOLD	ON HAND	CASES	COST	TIME
3									
4	100	10	5.25			15	15	78.75	NA
5	200	15	6.35			18	18	114.30	NA
6	300	25	9.55			25	25	238.75	NA
7	400	10	14.55			7	7	101.85	TRUE
8									
9								533.65	

Figure 4

EXERCISE TWELVE

FINANCIAL FORECASTING

DESCRIPTION

VisiCalc provides you with the capability to do complete financial statements and financial forecasting. You are able to update your financial statements or forecasts at any time by merely entering new values in those areas that are variables.

To demonstrate VisiCalc's ability, we have set up a FINANCIAL BALANCE SHEET with last year's balance sheet. We will forecast next year's balance sheet by using projected sales figures for the coming year.

OPERATIONS PERFORMED

Setting Up The Worksheet

Entering Mathematical Formulas

Making Worksheet Entries

Saving

Printing

FUNCTIONS USED

SUM
IF

COMMANDS USED

REPEAT LABEL	
FORMAT	R = justifies right
GLOBAL	C = column width
REPLICATE	copies
STORAGE	saves
PRINT	

SETTING UP THE FORMAT

The worksheet that you will set up and label is the FINANCIAL STATEMENT worksheet. Using the following instructions, copy Figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

	A	B	C	D	E
1	PROJECTED SALES 1982		600000		
2	----------				
3	SALES FOR 1981		400000		
4	PROFIT MARGIN SALES		10%		
5	STOCK DIVIDENDS		60%		
6					
7			BALANCE	BALANCE	PRO FORMA
8			SHEET	SHEET	BAL SHEET
9			FOR 1981	AS % OF	FOR PROJ.
10				81 SALES	SALES 82
11	----------				
12	CASH		10000		
13	RECEIVABLES		90000		
14	INVENTORIES		200000		
15			----------		
16	TOTAL CURRENT ASSETS		300000		
17	NET FIXED ASSETS		300000		
18			----------		
19	TOTAL ASSETS		600000		
20			==========		
21	ACCOUNTS PAYABLE		40000		
22	NOTES PAYABLE		10000	n.a.	
23	ACCRUED WAGE & TAXES		50000		
24			----------		
25	TOTAL CUR LIABILITES		100000		
26	MORTGAGE BONDS		150000	n.a.	
27	COMMON STOCK		50000	n.a.	
28	RETAINED EARNINGS		300000	n.a.	
29			----------		
30	TOTAL CLAIMS		600000		
31			==========		
32		ADDITIONAL FUNDS NEEDED			
33					----------
34			TOTAL ASSETS		

Figure 1

Your first operation is to change the column width from the standard 9 to a width of 10 characters for this exercise. To do this, type:

/G	starts GLOBAL command
C	column width
10	number of spaces per column
RETURN	executes the command

To enter your column labels, place your cursor on the location where you want to make your entry. VisiCalc automatically left justifies the label. To right justify the label, type:

/F	starts FORMAT command
R	justifies right

Type the column label.

Depressing the cursor (directional) key enters the label into the location and allows the cursor to be advanced to the next location.

NOTE

When entering a label that contains more characters than the width of the column allows, you must move the cursor to the next adjacent column and continue typing the label.

To be able to use a numeric value, or any special symbol as a label, you must first enter a quote " symbol to prepare the coordinate to accept it as a label.

Type in the rest of your column headings, using the sequence of commands above.

To enter dashed lines on your worksheet, move your cursor to the column and row where you want your dashed line to start (coordinate A2 in Figure 1). Type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

The column that your cursor is on will now have a dashed line across its width. To extend the dashed line in the same row, across other columns, leave your cursor where it is and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the dashed line your cursor is on
B2	the first coordinate in the row from which you wish the dashed line to be extended
.	ellipsis ... indicating from-to
E2	the last coordinate in the row you wish the dashed line to be extended to
RETURN	executes the command

The dashed line will now appear extended across the columns that you have indicated by your coordinates. To enter a double dashed line on your worksheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationship between column and row positions. The formulas and their positions are illustrated in Figure 2.

	A	B	C	D	E	
1	PROJECTED SALES 1982		600000			
2	----------					
3	SALES FOR 1981		400000			
4	PROFIT MARGIN SALES		10%			
5	STOCK DIVIDENDS		60%			
6						
7			BALANCE	BALANCE	PRO FORMA	
8			SHEET	SHEET	BAL SHEET	
9			FOR 1981	AS % OF	FOR PROJ.	
10				81 SALES	SALES 82	
11	----------					+C12/C3*100
12	CASH		10000	2.5	15000	+D12*C1/100
13	RECEIVABLES		90000	22.5	135000	
14	INVENTORIES		200000	50	300000	
15			----------			
16	TOTAL CURRENT ASSETS		300000	75	450000	
17	NET FIXED ASSETS		300000	75	450000	
18			----------			
19	TOTAL ASSETS		600000	150	900000	@SUM(D16...D18)
20			==========			+C21/C3*100
21	ACCOUNTS PAYABLE		40000	10	60000	+D21*C1/100
22	NOTES PAYABLE		10000	n.a.	10000	@IF(D22=0,C22,D22)
23	ACCRUED WAGE & TAXES		50000	12.5	75000	
24			----------			
25	TOTAL CUR LIABILITES		100000	22.5	145000	@SUM(D21...D24)
26	MORTGAGE BONDS		150000	n.a.	150000	
27	COMMON STOCK		50000	n.a.	50000	
28	RETAINED EARNINGS		300000	n.a.	300000	
29			----------			
30	TOTAL CLAIMS		600000	22.5	645000	@SUM(D25...D29)
31			==========			
32		ADDITIONAL FUNDS NEEDED			**255000**	+E19-E30
33					----------	
34			TOTAL ASSETS		900000	@SUM(E30...E32)

Figure 2

Formula number one, in the BALANCE SHEET AS % OF 81 SALES column, takes the amount in the CASH row and divides it by the amount of 1981 SALES. It then multiplies by 100 to display the result as a percentage.

Place your cursor on D12 and type:

+	prepares the coordinate to accept a numeric expression
C12	coordinate containing value
/	divides
C3	coordinate containing value
*	multiplies
100	value
RETURN	enters the formula

Formula number two, in the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column, takes the cash percentage and multiplies it times the PROJECTED SALES 1982 figure. The resulting amount is then divided by 100 to convert it to a dollar amount.

Place your cursor on E12 and type:

+	prepares the coordinate to accept a numeric expression
D12	coordinate containing value
*	multiplies
C1	coordinate containing value
/	divides
100	value
RETURN	enters the formula

Your next operation is to copy the formulas just entered, down the columns, using the REPLICATE command.

Place your cursor on D12 and type:

/R	starts REPLICATE command
E12	copies all entries down the columns D12 to E12

RETURN	prepares to receive additional information
D13	first coordinate where you wish to copy the formulas down the columns
.	ellipsis ... indicating from-to
D17	last coordinate where you wish to copy the formulas down the columns
RETURN	executes the command and prepares to receive additional instructions
R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

R
N

NOTE

You have just deleted your dashed line on row 15. To replace it, place your cursor on D15 and type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

Now place your cursor on E15 and type:

/-	starts REPEAT LABEL command
-	label to be repeated
RETURN	executes the command

You will now have a continuous dashed line in row 15.

Formula number three, in the BALANCE SHEET FOR 1981 column, adds the TOTAL ASSETS.

Place your cursor on D19 and type:

@SUM(	adds values in the list

D16	first coordinate in the list
.	ellipsis ... indicating from-to
D18	last coordinate in the list
)	closes the list
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formula just entered, across the row, into the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column.

Place your cursor on D19 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in D19
E19	coordinate where you wish the formula to be copied
RETURN	enters the formula
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number four, in the BALANCE SHEET AS % OF 81 SALES column, in the ACCOUNTS PAYABLE row, takes the ACCOUNTS PAYABLE FOR 1981 and divides that by SALES FOR 1981. The resulting value is then multiplied by 100 to convert it to a dollar amount.

Place your cursor on D21 and type:

+	prepares the coordinate to accept a numeric expression
C21	coordinate containing value
/	divides
C3	coordinate containing value
*	multiplies
100	value
RETURN	enters the formula

Formula number five, in the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column, in the ACCOUNTS PAYABLE row, takes the ACCOUNTS PAYABLE AS % OF 81 SALES and multiplies that time the PROJECTED SALES 1982 figure. The resulting figure is then divided by 100 to convert it to a dollar amount.

Place your cursor on E21 and type:

+	prepares coordinate to accept a numeric expression
D21	coordinate containing value
*	multiplies
C1	coordinate containing value
/	divides
100	value
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formulas just entered, in the same column into the ACCRUED WAGE AND TAXES row.

Place your cursor on D21 and type:

/R	starts REPLICATE command
E21	coordinate containing formula to be copied
RETURN	tells the command to copy the formula in E21
D23	coordinate where you wish the formula to be copied
RETURN	enters the formula
R	tells the command to copy the coordinate address in the formula relative to its new location
N	tells the command to copy the coordinate address in the formula in its new location without change

R
N

Formula number six, in the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column, NOTES PAYABLE ROW, uses the IF logic function to generate the values. If the notes payable for 1981 equal 0 (any label generates an 0 value) then use the 1981 figure. If not, use the NOTES PAYABLE as a % of 1981 SALES figure.

NOTE

> IF logic function contains three expressions separated by commas. The first expression generates a true or false value as a result of a logical operation. If the value is true, the IF selects the value generated by the second expression. If the value is false, the IF selects the value generated by the third expression.

Place your cursor on E22 and type:

@IF(	starts IF logic function
D22	part of the first expression which generates the first value to be compared
=	LOGICAL OPERATOR, compares the first value against the second and results in the logical value of true or false.
0	second value to be compared
,	comma-separates expressions in IF function
C22	coordinate containing value. Second expression in the IF function, which will be selected if the first expression is true
,	comma-separates expressions in the IF function
D22	coordinate containing value. Third expresion in the IF function, which will be selected if the first expression is false
)	closes IF logic function
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formula just entered, in the same column, into the MORTGAGE BONDS, COMMON STOCK and RETAINED EARNINGS rows.

Place your cursor on E22 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in E22
E26	first coordinate where you wish the formula to be copied
.	ellipsis ... indicating from-to
E28	last coordinate where you wish the formula to be copied
RETURN	executes the command and prepares to receive additional instructions
R R R	tells the command to copy the coordinate address of the formula relative to its new location

Formula number seven, in the BALANCE SHEET AS % of 81 SALES column, TOTAL CUR LIABILITIES row, adds the percentage total of current liabilities.

Place your cursor on D25 and type:

@SUM(	adds values in the list
D21	first coordinate in the list
.	ellipsis ... indicating from-to
D24	last coordinate in the list
)	closes list
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formula just entered, in the same row, into the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column.

Place your cursor on D25 and type:

/R	starts REPLICATE command

RETURN	tells the command to copy the formula in D25
E25	coordinate where you wish the formula to be copied
RETURN	enters the formula
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number eight, in the BALANCE SHEET AS % OF 81 SALES column, TOTAL CLAIMS row, adds the total percentage of claims.

Place your cursor on D30 and type:

@SUM(	adds values in the list
D25	first coordinate in the list
.	ellipsis ... indicating from-to
D29	last coordinate in the list
)	closes the list
RETURN	enters the formula

Your next operation is to copy, using the REPLICATE command, the formula just entered, in the same row, into the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column.

Place your cursor on D30 and type:

/R	starts REPLICATE command
RETURN	tells the command to copy the formula in D30
E30	coordinate into which the formula is to be copied
RETURN	enters the formula
R R	tells the command to copy the coordinate address in the formula relative to its new location

Formula number nine, in the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column, ADDITIONAL FUNDS NEEDED row, subtracts TOTAL CLAIMS from TOTAL ASSETS to calculate the additional funds needed.

Place your cursor on E32 and type:

+	prepares the coordinate to accept a numeric expression
E19	coordinate containing value
-	subtracts
E30	coordinate containing value
RETURN	enters the formula

Formula number ten, in the PRO FORMA BAL SHEET FOR PROJ. SALES 82 column, TOTAL ASSETS ROW, adds the TOTAL ASSETS in that column.

Place your cursor on E34 and type:

@SUM(	adds values in the list
E30	first coordinate in the list
.	ellipsis ... indicating from-to
E32	last coordinate in the list
)	closes the list
RETURN	enters the formula

Now that your worksheet formating is complete, you may wish to print the formulas for later use.

To print the formulas, type:

/S	starts STORAGE command
S	saves
.PRINTER	prints the file
RETURN	executes the command

MAKING WORKSHEET ENTRIES

Now your worksheet is complete and ready to be updated. You are able to update the financial worksheet and forecast by changing any of the variable values. To illustrate this, we have changed the value of PROJECTED SALES 82 as illustrated in Figure 3. This simultaneously updated the values in the PRO FORMA column. You may also make any other entries which may be pertinent to your PRO FORMA projections.

	A	B	C	D	E
1	PROJECTED SALES 1982		800000		
2					
3	SALES FOR 1981		400000		
4	PROFIT MARGIN SALES		10%		
5	STOCK DIVIDENDS		60%		
6					
7			BALANCE	BALANCE	PRO FORMA
8			SHEET	SHEET	BAL SHEET
9			FOR 1981	AS % OF	FOR PROJ.
10				81 SALES	SALES 82
11					
12	CASH		10000	2.5	20000
13	RECEIVABLES		90000	22.5	180000
14	INVENTORIES		200000	50	400000
15					
16	TOTAL CURRENT ASSETS		300000	75	600000
17	NET FIXED ASSETS		300000	75	600000
18					
19	TOTAL ASSETS		600000	150	1200000
20					
21	ACCOUNTS PAYABLE		40000	10	80000
22	NOTES PAYABLE		10000	n.a.	10000
23	ACCRUED WAGE & TAXES		50000	12.5	100000
24					
25	TOTAL CUR LIABILITES		100000	22.5	190000
26	MORTGAGE BONDS		150000	n.a.	150000
27	COMMON STOCK		50000	n.a.	50000
28	RETAINED EARNINGS		300000	n.a.	300000
29					
30	TOTAL CLAIMS		600000	22.5	690000
31					
32		ADDITIONAL FUNDS NEEDED			**510000**
33					
34			TOTAL ASSETS		1200000

Figure 3

SAVING

Now that you have made the worksheet entries as illustrated above, you may wish to save the entire report for later use or print it for filing or distribution.

To save the entire worksheet, type:

/S	starts STORAGE command
S	saves

FIN.STA	name of file; do not type spaces between words
RETURN	executes the command

PRINTING

To print a portion or all of your report, place your cursor on A1, the upper-left coordinate of the worksheet area rectangle that you wish to print and type:

/P	starts PRINT command
P	printer
E34	the lower-right coordinate of the worksheet area rectangle that you wish to print
RETURN	executes the command

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